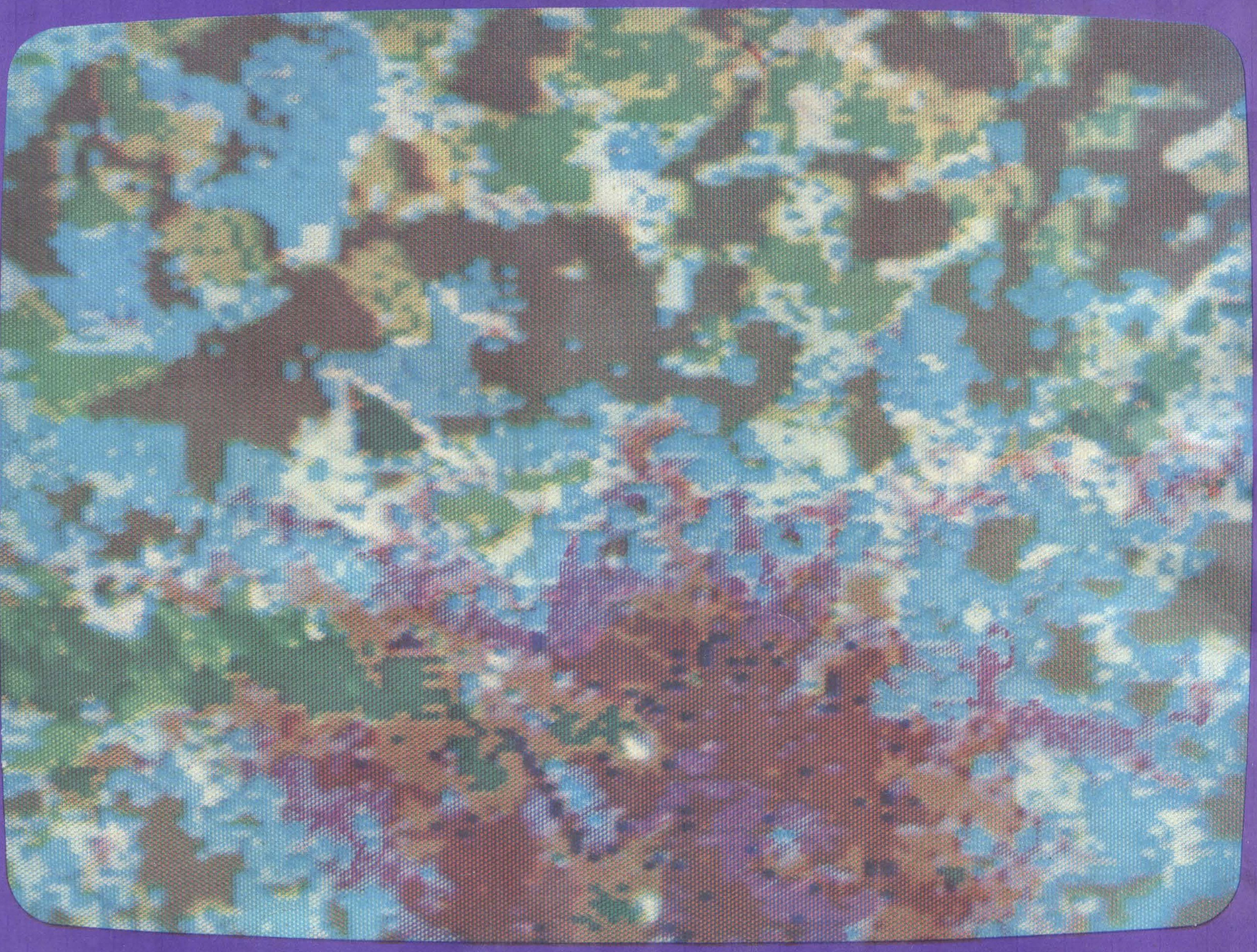
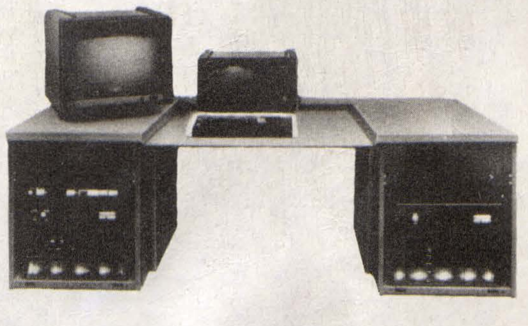
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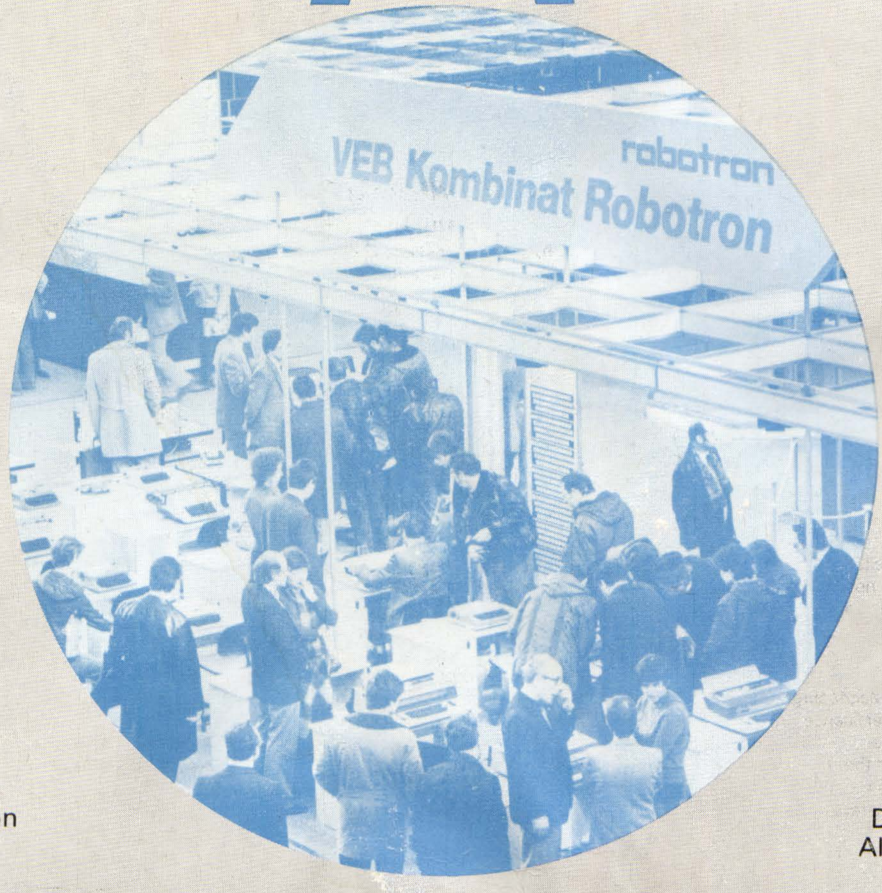




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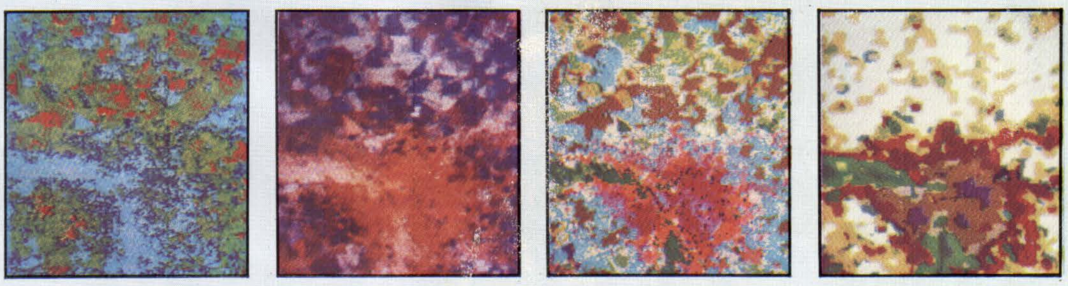


VEB Kombinat Robotron
Grunaer Strasse 2
DDR – 8010 Dresden

Exporter:
Robotron Export-Import
Volkseigener
Aussenhandelsbetrieb
der Deutschen
Demokratischen Republik
Allee der Kosmonauten 24
DDR – 1140 Berlin

GDR EXPORT

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Picture analysis by classifying a multispectral aerial photograph

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Editorial Office:
GDR EXPORT
Telephone: 4 38 73 11
Telex: 114566 wirts dd
Cables: wirtschaftsexport berlin
Editor:
G. Romanowski (Mrs.)

Deputy Editor: B. Fahland
Associate Editor:
I. Hauff (Mrs.)
English Editors:
W. Winkler,
Ch. Köhler (Mrs.)
Art Editor:
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Where to Receive Information

Ministry of Foreign Trade of the German Democratic Republic
Unter den Linden 44/60
DDR–1080 Berlin
Telephone: 2 30 (switchboard)
2 37 (plus extension number)
Telex: 1152361 mah dd
Cables: windrose berlin

Chamber of Foreign Trade of the German Democratic Republic
Schönholzer Str. 10/11
DDR–1100 Berlin
Telephone: 4 82 20
Telex: 114840 inter dd
Cables: interkammer berlin

Interwerbung GmbH
Gesellschaft für Werbung und Auslandsmessen der Deutschen Demokratischen Republik
Hermann-Duncker-Strasse 89
DDR–1157 Berlin
Telephone: 5 09 09 81
Telex: 112106 integ dd
Cables: interwerbung berlin

Leipzig Fair Office
Markt 11/15
DDR–7010 Leipzig
Telephone: 7 18 10
Telex: 512294 lma dd
Cables: messeamt leipzig

Berlin Branch Office
Friedrichstr. 167/168
DDR–1080 Berlin
Telephone: 2 29 24 52
Telex: 114820 leipm dd
Cables: leipziger messeamt berlin

Robotron Export-Import
Volkseigener Aussenhandelsbetrieb der Deutschen Demokratischen Republik
Allee der Kosmonauten 24
DDR–1140 Berlin

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Computer Hardware, Office Machines, Measurement Electronics–Proved the World Over

Friedrich WOKURKA
Director-General, VEB Kombinat Robotron

In close co-operation with the USSR and the other socialist countries, a powerful computer, office machinery and measurement electronics industry has come into being in the course of thirty-five years of dynamic development of the GDR.

In this issue of GDR EXPORT, VEB Kombinat Robotron–an established exporting combine–presents its wide range of products and services.



Industry, reliability, know-how, skill and expertise of over 70,000 workers, scientists, engineers and marketing specialists have, in the past years, increased our combine's performance to such an extent that today Robotron products can be found in over sixty countries. The stable growth of the GDR's economy has formed the background to this successful development.

Seventy per cent of the combine's output are exported. In line with the close economic, scientific and technical co-operation among the CMEA countries, most of the products being exported are geared to the economic requirements of these countries.

In the past ten years, exports to socialist countries have nearly quadrupled. Over sixty per cent of all exports go to the Soviet Union. At the same time, imports from the CMEA countries have been growing continuously. Upwards of two hundred EC 1020 and EC 1022 electronic data processing installations from the GDR are in operation in the USSR. Robotron electronic data processing installations and small computers are equipped with peripheral units made in other socialist countries.

Multilateral co-operation covering the Unified Computer System (UCS) and the Small Computer System operated by the CMEA countries, and direct bilateral co-operation between manufacturing enterprises and scientific institutions of socialist countries, are essential prerequisites which enable the combine to meet its tasks. The Research Centre for Electronic Data Processing (NITSEVIT) in Moscow, the Institute for Electronic Control Computers (INEUM), and the international economic organisation Interatominstrument are among the institutions with which our combine has been maintaining fruitful relations for a number of years.

In preparing for the operation of Robotron electronic computer equipment in the USSR, VEB Kombinat Robotron has for several years been co-operating directly with the users in various branches of the economy. Such contacts, which are underpinned by contracts, agreements, and joint working plans, are in force with financial institutions, agricultural enterprises, and enterprises of the mineral oil industry. We have found that such working partnership is very useful for the Robotron combine, because in this way we can obtain ideas and conceptions directly from the users of our equipment and develop and produce our equipment accordingly. Over and above, this form of co-operation helps to elaborate user program packages.

Work on implementing the GDR-USSR intergovernmental agreement on scientific-technical co-operation, production specialisation and mutual deliveries of equipment for the acquisition, recording and condensing of information, and the GDR-USSR intergovernmental agreements on communications, measuring and nuclear engineering, is likewise proceeding with great intensity.

Bilateral agreements on joint research and development projects, and on mutual goods deliveries and services are also in force with other socialist countries.

robotron Programme

The combine's production and export programme includes edp systems of the second UCS generation with complex application lines and comprehensive software, office computers, problem-oriented packages based on microcomputers, typewriters, word processors and drafting equipment, terminals and electronic measurement equipment.

System, standard and specialised software is developed and supplied in conjunction with the installation of robotron computers. This software is put at user's

The CMEA headquarters in Moscow's Kalinin Prospekt– a symbol of international socialist co-operation



disposal in a special program and project engineering centre, in which more than 8,500 programs are currently stored.

We carry out studies and prepare expertises on application possibilities, work out organisation projects, undertake programming jobs, assist the client in launching the project, and conduct training of the user's personnel. It is not merely a question of selling computer programs, but also of providing organisational solutions which ensure a high degree of efficiency for the user. The organisation of the computerisation of financial operations in Moscow's GOSBANK can be mentioned as an example.

The current issue of GDR EXPORT is designed to acquaint you mainly with complex computer applications, many of which we developed and tested in collaboration with users in the GDR. The use of the large software capacities in the entire national economy on the basis of state regulations and the close co-operation with GDR research centres provide favourable conditions for working out new application solutions.

Experience gained in applications engineering and in installing such complex systems in the GDR is put at the service of users abroad and helps to raise the operational effectiveness of computers.

These are the national and international foundations on which the combine, which codetermines the international standard of science and technology in its specialised line, develops its productive power and creative potential.

USSR–Principal User of GDR-made

Trade relations between the GDR and the USSR have developed successfully and there has been a steady increase in the goods exchange between the two countries. The EC 1055 and EC 1055 M edp installations which form part of the Second Generation of the Unified Computer System (UCS) account for a considerable share in this trade expansion.

The EC 1055 M, a modular-built system, has been designed for universal application. The advantages of socialist economic integration become particularly evident in the export of type 1055 edp installations covered by the 1968 UCS agreement. The majority of the peripheral equipment (made in Bulgaria, Poland, Hungary and the USSR itself) is supplied by the Soviet trading partner directly to the customer. Assembly work is carried out by the Soviet NOTO organisation or jointly by specialists from the GDR, the USSR, Bulgaria, Poland and Hungary, as the case may be. On user's request, the compatibility of equipment other than type 1055 is examined and established by coupling tests.

Since 1974, 450 edp installations of types EC 1040, EC 1055 and EC 1055 M have been supplied to the USSR.

The EC 1055 M edp installation is backed up by efficient operating systems. The well-known OS/ES operating system comprises, inter alia, a control program configuration known as SVS (system of virtual storages) with the help of which an address space of 16Mbytes can be attained.

The SVM/ES system (system of virtual computing machines) is an extension of the SVS concept covering the entirety of the equipment included in the EC 1055 M edp system concerned. Within the framework of teleprocessing the EC 1055 M system is used as host computer.



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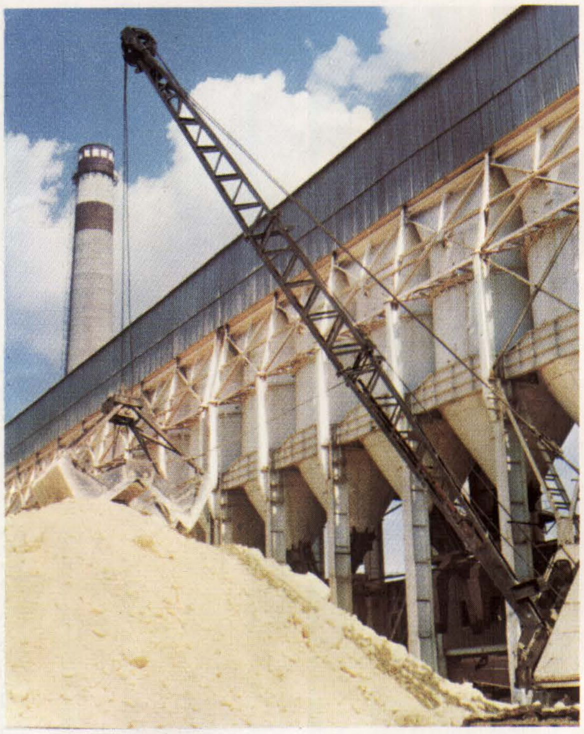


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1 1984 Leipzig Spring Fair: Contracts covering the exchange of computer and office equipment totalling 168.6m roubles were signed by the director-general of the Soviet Elektronorgtekhnika trading organisation, Mr. Yuri A. Kislenko (left), and his GDR counterpart, Dr. Frank Seiffert, of Robotron Export-Import

2 The EC 1055 M edp system has been designed for universal application

Electronic Data Processing Equipment



3



4

Special Hardware Units of the EC 1055 M EDP System

The performance capability of the EC 1055 M system is further enhanced by linking a few special devices.

With the help of a channel adapter, for example, effective local multiprocessor systems can be formed. Being highly reliable, they are used to enlarge the edp system's processing capacity.

For solving certain problems associated with numerical mathematics, which require very large quantities of data to be handled within a reasonable time span, a special arithmetic unit known as matrix module (MAMO) is offered. This unit can be linked directly to an EC 2655 M central processor. Its use for data processing applications involving a large amount of mathematical operations affords the user a computing speed 50 times that of a computer which does not use this matrix module.

Close and Diversified Co-operation

VEB Kombinat Robotron co-operates closely with Soviet users in widely differing sectors of research and economy. Close ties backed by agreements, contracts and joint work schedules are being maintained with the following institutions:

- United Nuclear Research Institute, Dubna;
- Kurchatov Institute for the Peaceful Application of Atomic Energy, Moscow;
- Research Centre for Electronic Data Processing (NITSEVIT), Moscow;
- Ministry of the Petroleum Industry of the USSR;
- State Committee for the Supply of Materials and Equipment to the Agricultural Industry of the USSR;
- WAS and KAMAS auto works;
- GOSBANK and Foreign Trade Bank of the USSR.

Co-operation relations such as these benefit both the user and the producer. This way, effectiveness is increased and the range of program packages extended.

An outstanding example demonstrating the close and fruitful co-operation are the NEWA 1 M and ENSAD 4310 message exchange computers developed by Robotron along with specialists of the Institute for Cybernetics of the Academy of Sciences in Kiev, the Ministry of Posts and Telecommunications and the Central Research Institute of Communications in Moscow. This joint development forms part of the work aimed at evolving a unified system of electronic message switching. Meanwhile, VEB Kombinat Robotron has been commissioned by the USSR to commence serial production.

These control complexes can also be employed as a centralised control unit for different switching facilities. By doubling the control mechanism they ensure high reliability and flawless operation of the switching system even if one or several units of the control complex become inoperative. The breakdown rate of the switching system is claimed not to exceed two hours in twenty years.

This joint development is a key project implemented within the framework of socialist economic integration.



5

3 and 4 Electronic data processing equipment from VEB Kombinat Robotron is being employed in the Soviet oil industry for solving a large variety of problems

5 Car plant at Togliatti on the River Volga.–Here, too, Robotron edp installations are in operation

Computers in the Financing Business– A Diversity of Problem Solutions

VEB Kombinat Robotron can draw upon a wealth of experience in the decentralised operation of data processing hardware in the field of finances. Monetary and credit institutes and other areas of the finances at home and abroad are using a wide range of robotron hardware such as:

- Invoicing and accounting machines
- Data entry units
- Office computers
- Small computers
- Data processing installations
- Remote processing systems.

A complete package for computer operation in the financing business has been developed for the purpose. The package has a modular set-up so that system solutions can be progressively introduced and subsequently expanded. It can be adapted to the pattern of orders encountered in banking and credit institutes, and national peculiarities can be taken into account. A commensurate example is given in the graph.



1

The package will simplify and automate the following routines:

- Data entry (with plastic cards bearing magnetic strips)
- Data verification (list of blocked accounts, logical checks)
- Data preparation (edp-conform formatting)
- Data supplementation (daily data, constant data, test data)
- Data allocation (defining the processing zones and planes)
- Data transfer and transfer checks
- Data processing and posting, and posting confirmation
- Cash payments
- Provision of information for management and planning (operating data) and for the customer service (statements of accounts).

The package can be used in banking and credit institutes, in the postal services, and by insurance companies.

Application in the USSR

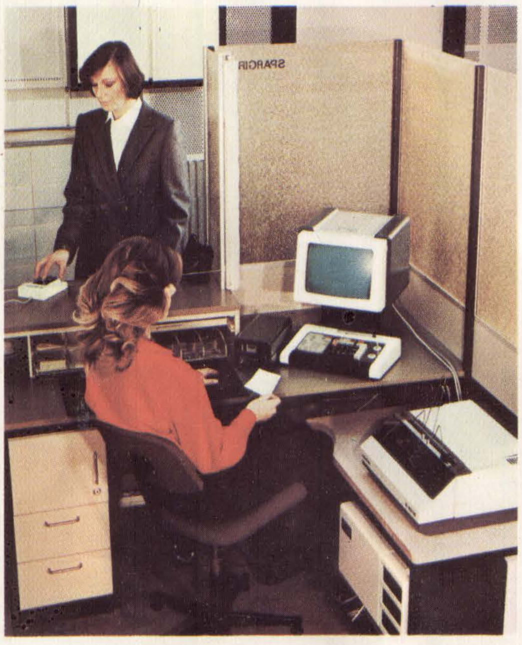
The first comprehensive contractual arrangement on deliveries and services for ASU MGK GOSBANK of the USSR (department for the city and district of Moscow) was concluded with the Soviet foreign trade enterprise V/O Elektronorgtekhnika in February 1984. The contract specifies the delivery of three twin-computer systems of the EC 1055 M type which are interlinked by channel adapters. This set-up ensures the utmost reliability and safety of information processing, and it virtually excludes system failures.

The second plane of the system covers the branch offices in the city and district of Moscow, most of which are equipped with processing computers of the CM 1630 type. The third plane involves the actual bank counter terminals of the K 8924 type which are connected to the processing computers via telephone lines.

Transition from the old banking system to the new ASU MGK GOSBANK system makes it necessary to define the pertinent hardware and software conditions so that the data carriers of the old system become readable by the new system. All these measures will secure capabilities for batch-bulk processing, interactive communication and real-time operation. The ASU MGK GOSBANK system is to be introduced in several stages.

The individual information processing solutions are to be defined more precisely for better exploitation of the potential of the installed Robotron computer hardware. Every second of computer time that is saved with each document means that the turnround time of the documents to be handled daily will be shortened. The EC 8404 M terminal control computer is a new device that was specially developed for the purpose of increasing the operating efficiency of the bank counter terminals.

Under the contract VEB Kombinat Robotron will also render comprehensive programming services to GOSBANK so that the supplied standard software can be tailored to specific applications in co-operation with GOSBANK employees.



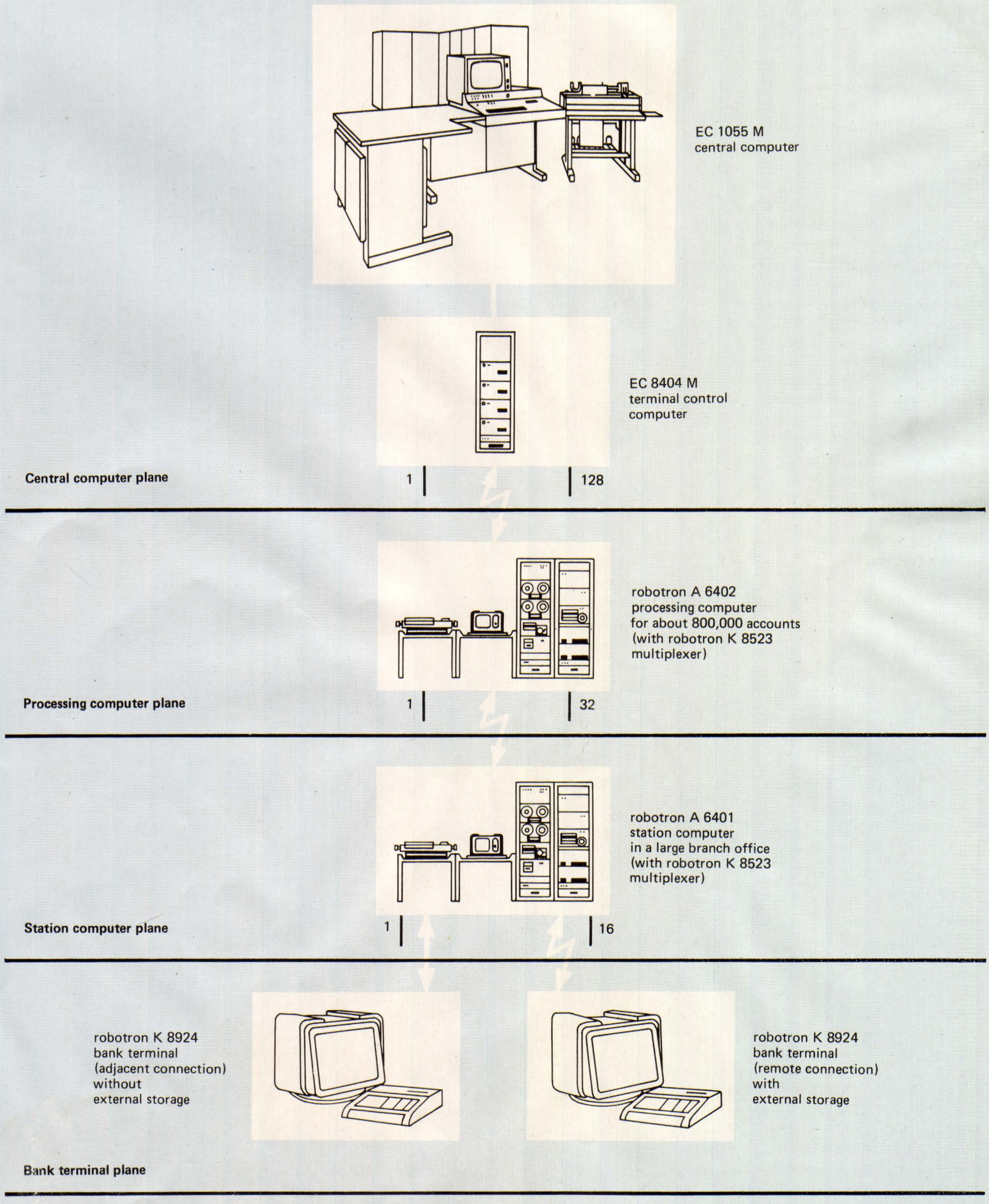
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Wide-ranging Delivery Programme

Next to the computer station proper, the contract envisages the delivery of the requisite air conditioning equipment, special flooring, noise-proofing insulation, electrical equipment, and a fire alarm system. On top of this, VEB Kombinat Robotron supplies the engineering for and conducts the building work involved.

1 and 2 robotron computers in operation in a bank

Suggested configuration



Digital Image Processing

As a type of future-oriented information processing, digital image processing is a prerequisite to large-scale rationalisation of conventional applications in research and development of, say, medicine and industrial production.

Digital image processing can be characterised as follows: an image is split up into picture elements (pixels) and scanned in such a way that intensity values obtained from light (either reflected or transmitted, which depends on the type of master copy–photograph or film transparency–used) are digitised and stored. Subsequent processing by means of a digital computer may serve the purpose of image improvement, isolation, recognition and identification of objects, extraction of characteristics, or image interpretation and classification–depending on the application. These results are put out as pictorial, graphic, alphanumeric, or digital representations. The hardware provided for digital image processing comprises image digitisers, digital computers, and output devices presenting the various results (Fig. 1). Processing units and output devices form an integrated system which is designated "image processing system".

The robotron A 6470 image processing system is the outcome of R & D work conducted jointly by VEB Kombinat Robotron and the Central Institute of Cybernetics and Information Processes of the GDR Academy of Sciences. Also GDR and USSR research centres and institutions dealing with remote sensing of space objects have had a considerable share in the development of the system.

Several Models to Solve Differing Problems

The A 6471 model is a developing and processing system designed for users who require high accuracy and flexibility in processing but have only little image data to process and no need for real-time processing. The A 6471 model also covers a comprehensive software service for high image processing efficiency.

The hardware consists of a K 1630 M microcomputer system, standard peripherals such as magnetic tape and magnetic disk storages and a graphics processing unit featuring an image storage, a track ball, a graphics control device, and a multi-colour monitor.

The A 6472 model is an interactive work station for high-speed image processing. A high-performance special processor enables image information of medium size to be processed at video speed, which denotes real-time processing of images.

The software basis has been extended by adding some function modules integrating the special processor.

Depending on the given application, the hardware comprises a K 1630 or K 1620 microcomputer system with standard peripherals, an image storage of at least 1 Mbyte, a display processor (which is a special processor with a processing speed of 100 million operations per second), and the aforementioned graphics processing unit.

The A 6473 model has a maximum of four A 6472 interactive work stations which, though independent of one another, cooperate under control of a dispatcher computer. The latter can be used for assigning tasks ad hoc, for collecting and condensing processing results, and for controlling communication with higher-level computers. In addition, the dispatcher computer is equipped with a 1 Mbyte multiport image storage, which can be used by each of the four interactive work stations.

Thanks to its high performance capability, the A 6473 model is suitable for applications requiring high image data rates and time-parallel processing. It has been designed mainly for setting up image processing centres that have to solve ad hoc problems.

Comprehensive Software for Various Applications

The software required for operating the A 6470 image processing system comprises:

- A model-oriented microcomputer operating system
- A user-specific menu system
- An interactive user system
- Programming aids for users to create software of their own.

For large-scale or standard applications of digital image processing, Robotron offers user-specific software packages to supplement the basic software.

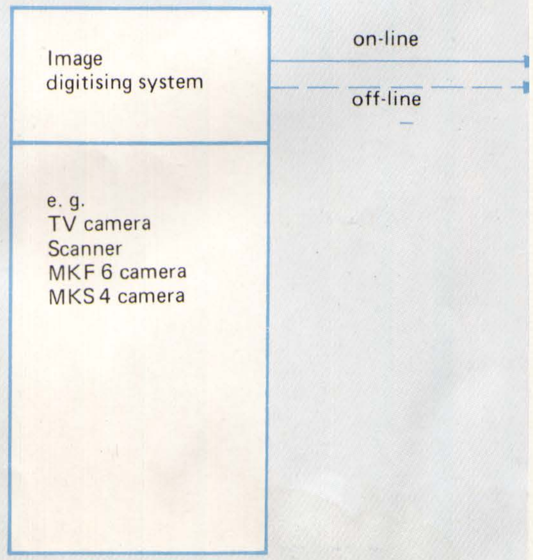
Thus, a program package for automated microscope image analysis in the fields of histology and biomedicine has been developed on the basis of many years' research work under the direction of specialists of the Dresden Medical Academy and the Berlin Charité Hospital.

As result of successful research work conducted at the Central Institute of Cardiac and Circulatory Investigation of the GDR Academy of Sciences, several software packages have been made available for X-ray image processing. They come in the application line "digital subtraction angiography". The use of the A 6472 model allows analyses



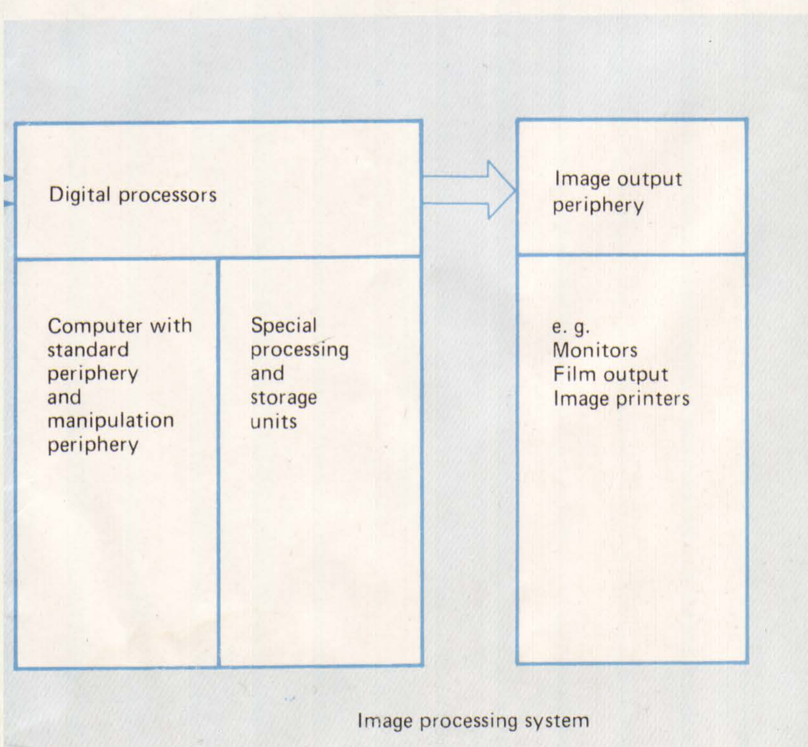
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Hardware system for digital image analysis



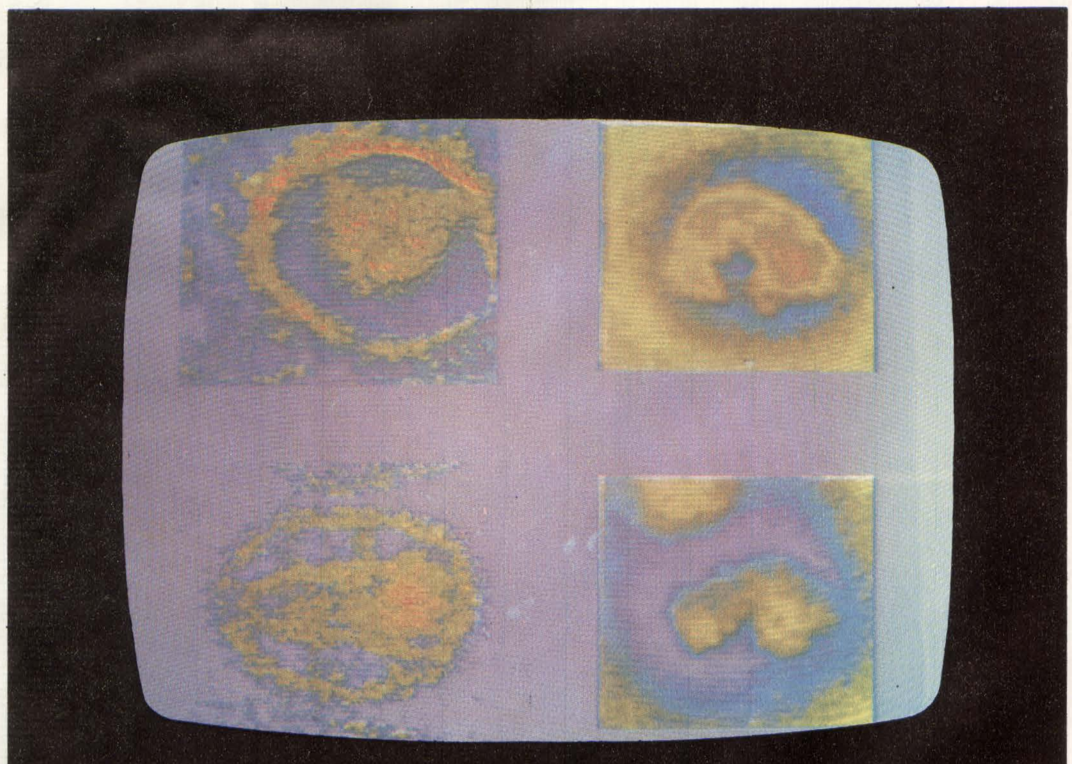
1 and 2 A 6472 image processing system.–Application examples



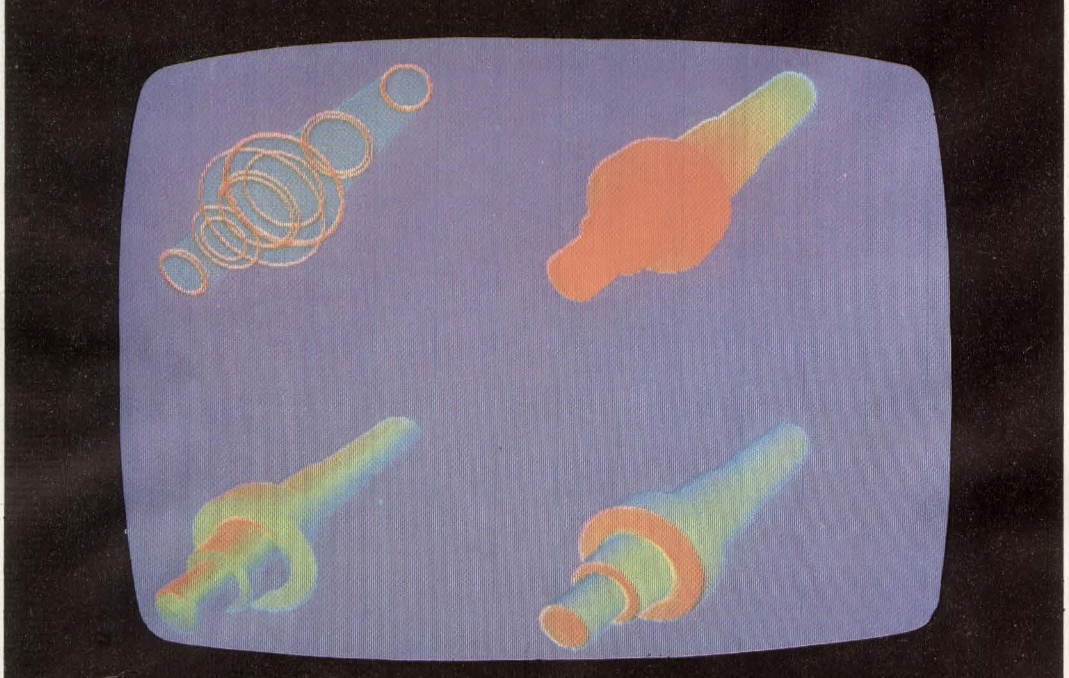




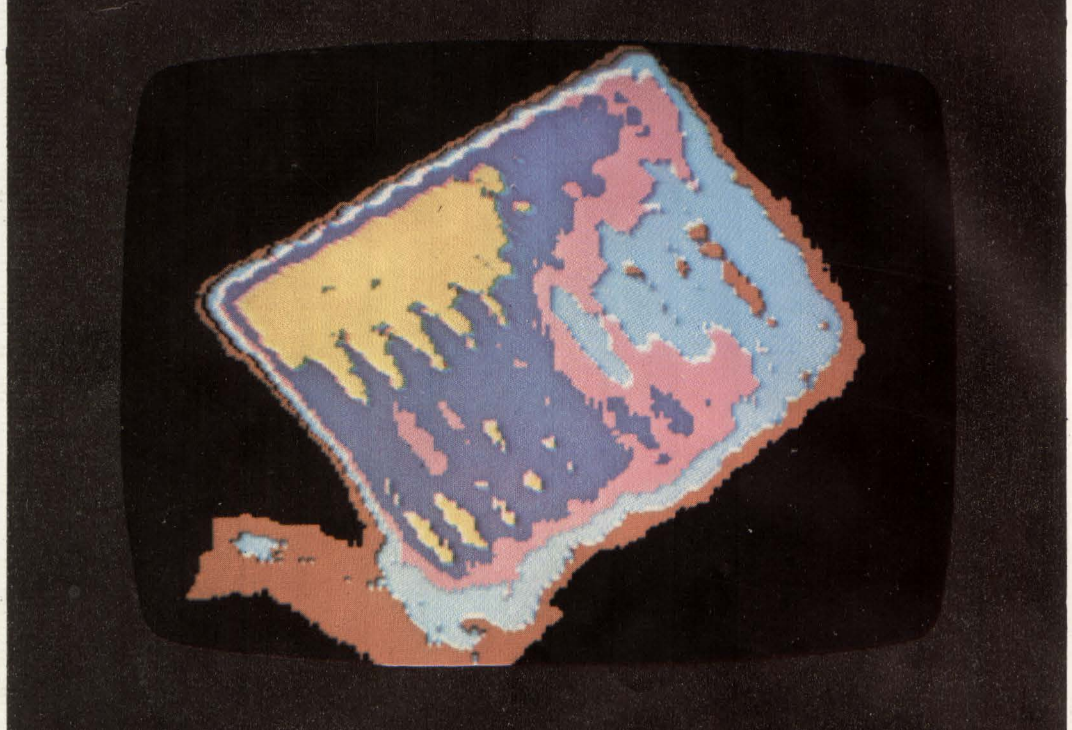
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4



5

3 Analysis of cells of selected organs

4 In-process image evaluation

5 Examining the heat behaviour of buildings

to be made while patients are being examined. At the same time, patients' exposure to radiation is diminished and arterial catheterisation considerably reduced.

As far as "remote sensing of the earth" as another application area is concerned, the spectrum of software components on offer is widened by those evaluating pictures taken via satellite, spacecraft, and aircraft. These are multichannel, multispectral, infrared, and radar images. In co-operation with competent research centres particularly components for real-time processing and mass image data management are being developed for ad hoc use of the A 6470 image processing system. The specific software is developed jointly with Soviet counterparts.

Large-scale User Back-up

In Robotron's own image processing centre, prospective users may obtain advice and use testing facilities as an aid to developing their own programs.

In addition, exchange of experience relative to specific problems and subjects, as well as co-operation between users and the image processing system developers are being offered.

VEB Robotron-Vertrieb Berlin organises training courses dealing with the robotron image processing system plus application software, and it operates a comprehensive back-up service.

The robotron A 6470 digital image processing system was first presented to international experts at exhibitions held in Moscow (1982), Vienna (UNISPACE '82) and Paris (SICOB '82). The good response met with confirms that the system is among the best in its class by world standards. It has stood the test both at home and abroad, e.g. within the framework of a UN-sponsored project.

Computers to Rationalise Port Turnover Processes



In close co-operation with VEB Seehafen Rostock–the GDR seaport authority–VEB Kombinat Robotron developed and translated into practice, in 1983, solutions for computer application to make both technological and commercial processes concerning mechanical handling operations in seaports more efficient. These processes include the transshipment of bulk materials such as ores or apatite; of general cargo such as wire coils; and of grain, including fish meal and feedstock. According to the nature of goods handled, these application solutions were designated as "bulk material", "general cargo", and "grain", respectively.

Essentials of the Technical Solutions Offered

In the frame of the above application solutions, computers are used for controlling technological processes and for carrying out commercial processes such as planning, checking, accounting. Special rationalising effects are attained by attaching computing equipment to port handling equipment such as ship unloaders, belt conveyors, pneumatic conveyors, wagon loading stations, and the like.

The basis for this to be done are, on the one hand, reference values (in the form of unloading or loading orders) and, on the other hand, actual values (acquired either along with or immediately following materials handling). The reference values result from scheduling the handling operations. They control the technological process, while the actual values obtained are the basis for checking and accounting mechanical handling processes.

The high level of the technical solution offered has three aspects, namely:

(1) Data acquisition and communication is realised by data radio equipment. How useful this is can be demonstrated by wagon data acquisition: Here the specific wagon data items such as normal loading weights and wagon numbers are, when a train is being made up, communicated by radio to the computer. These data items are the basis for calculation of any consignee's loading program.

Another application variant of data communication by radio is the unloading process of, say, imported wire coils: When slung to the unloading crane the particular coil is identified and the data is being transmitted by radio to the computer. Then the computer will assign it to a particular consignee, that is, to a particular wagon, or the computer may even decide to store it temporarily. The co-ordinates of the place of intermediate storage or the particular wagon number will be displayed on the data transmission device (which is a portable interactive terminal).

(2) The computing capabilities can be used in situ, that is, where required. This is due to a terminal-oriented hardware concept, which may be demonstrated by the way the consignment notes and other necessary documents are printed: Printers are installed at the points where trains are being handled, for the purpose of printing out bills of lading, specifications, and wagon chits, using standard forms. What is more, the principle holds that any user can, regardless of where he is located, access the resources of the computer system.

(3) To secure maximum availability of the computer system, an A 6402 duplicate computer system is used, allocating the tasks as follows:

- The actual, time-sensitive processes are controlled by one computer, while another computer collects, prepares and evaluates data.
- In the event of a malfunction arising in either computer, the computing capacity of the other one, left intact, will without difficulty take care of all the time-sensitive processes.

Design Principles

The application solutions "bulk material", "general cargo" and "grain" are based on design principles which essentially cover the same scope of performances. These principles may be illustrated by relating again to the example of handling imported wire coils:

(1) For scheduling bulk material, general cargo and grain handling, major data can be obtained from answers to these questions:

- When is which ship with what cargo due in the port?
- Which consignee will get which quantities of the cargo?
- How much cargo space of what type is available?

Proceeding from these fundamental data items and by taking the mechanical handling equipment, storage space and manpower available into consideration, the computer can generate both unloading and loading programs, which can be displayed on terminal screens or used directly for controlling automated wagon loading stations. The scheduling factors such as "day" or "shift" are freely progammable.

(2) For checking and controlling mechanical handling processes the shift superintendent can use his terminal screen in order to be constantly aware of the progress of transshipping by making comparisons between desired and actual values. He can control the processes by responding to troubles occurred and by varying his arrangements as to capacity assignment according to varying actual needs.

(3) Printing of documents required: As soon as a train or part of it has been loaded with, say, bulk cargoes, it is required that bills of lading, route labels and other certificates or specifications meeting European standards be issued. Likewise, when exporting goods, ship's papers such as mate's receipts are needed. All these documents are printed by means of a terminal printer.

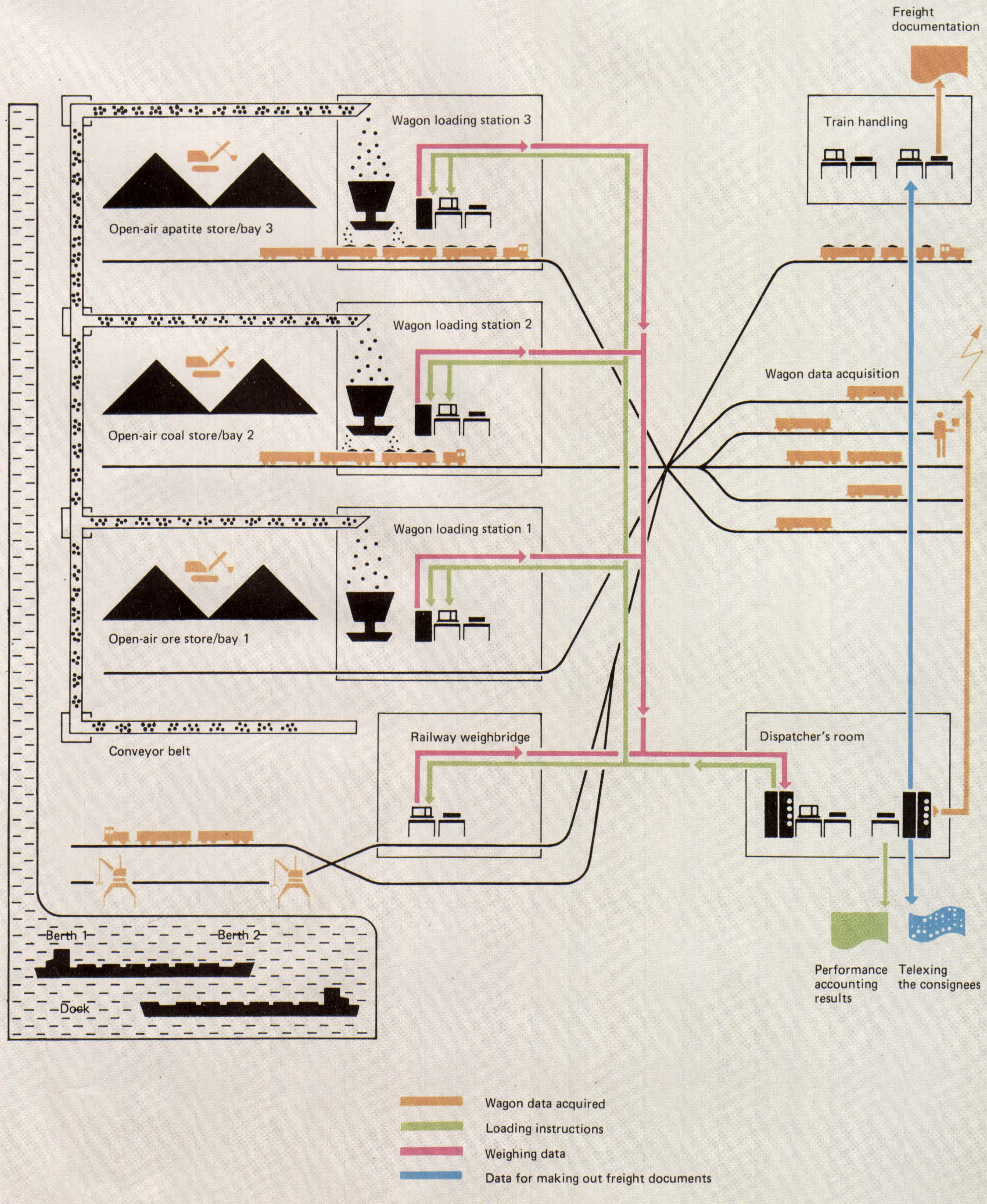
(4) Accounting of performances: For definable periods of time and special divisions such data as output per shift, output per day performance per team, loading balances, ship's accounts, work reports, storage charges and the like is supplied as a result of evaluating the data acquired. Formats and contents of the lists to be printed can be defined by the user himself.

Results

The application solutions "bulk material", "general cargo" and "grain" permit their users:

- to increase transshipping performances by efficiently using all the resources available;
- to reduce laydays;
- to avoid human interference in scheduling, controlling and accounting commercial processes on a major scale;
- to utilise storaging and loading space efficiently;
- to eliminate unnecessary wait when making out bills of lading, ship's papers and accounting documents;
- to make unloading, storaging and loading more transparent from both a technological and commercial point of view through the facilities of immediate performance accounting, unloading and loading balances; and inventory analyses;
- to be constantly informed about the progress of loading or unloading a ship.

"Bulk material" information system



Problem-oriented Computer Systems for Soviet Agriculture



1

The State Committee for the Supply of Materials and Equipment to the Farming Industry of the USSR (GOSKOMSELKHOZTEKHNIKA) has set itself the task to automate all operations involved in providing Soviet agriculture with materials and equipment. This project which is scheduled to be completed by 1985 foresees the complex use of computing equipment. One of the major goals in this connection is to improve the supply of spare parts required for tractors and other farm machinery and to utilise transport capacities more efficiently.

VEB Kombinat Robotron is taking part in the realisation of this project on the basis of an agreement on scientific, technological and economic co-operation covering the period up to 1985.

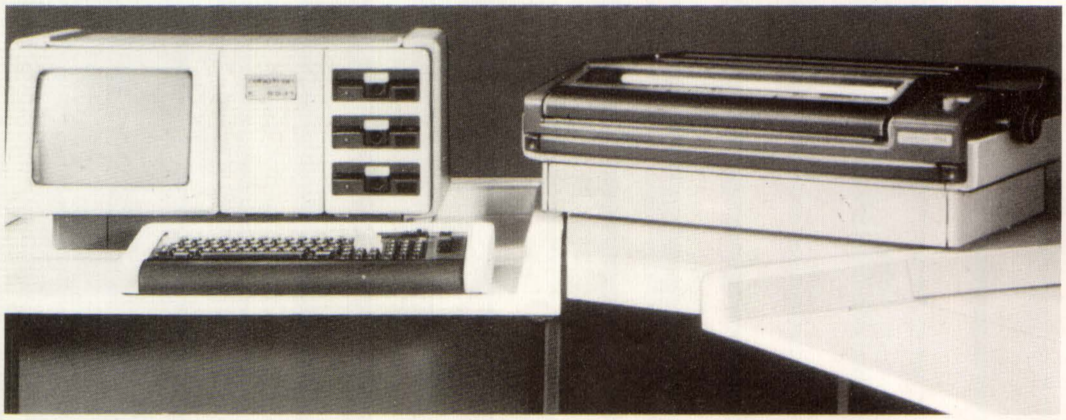
The key objective is to create problem-oriented complexes. To this end decentralised electronic data processing installations supplied by VEB Kombinat Robotron are used in addition to software specially developed for district-level supply and service enterprises (RAYSELKHOZTEKHNIKA) on behalf of the above-mentioned State Committee (GOSKOMSELKHOZTEKHNIKA), as the major form of territorial distribution. In the USSR there are altogether about 11,200 such district-level enterprises.

VEB Kombinat Robotron particularly contributes to these efforts by supplying its robotron A 6402 computer system, which stands out for:

- A modular hardware concept, permitting any computer to be configured in such a way that it will meet actual requirements;
- A modular system-software concept, allowing the MOOS 1600 and LAOS 1600 operating systems to be generated;
- An extensive modular application-software package.

The flexibility of the new computer system along with the comprehensive software available have created the prerequisites to close co-operation with the Soviet agricultural industry.

The following problem-oriented computer complexes have been developed for the purpose of applying robotron systems in Soviet agro-technical centres.



2

Performance Accounting of Haulage Contractors

Problem

Establishing an overall system of managing and controlling all haulage operations on the basis of standard haulage orders and way bills as employed in the USSR.

1 Robotron computer systems have been operated with success in agro-technical centres in the USSR

2 robotron A 5120 office computer

3 robotron A 6402 computer system

4 robotron K 1630 microcomputer system

Requirements

- Reliable and efficient evaluation of both haulage orders and way bills;
- Reusability of facilities and methods without the need for time-consuming adaptation;
- Utilisation of existing forms of organisation;
- Decentralised data processing.

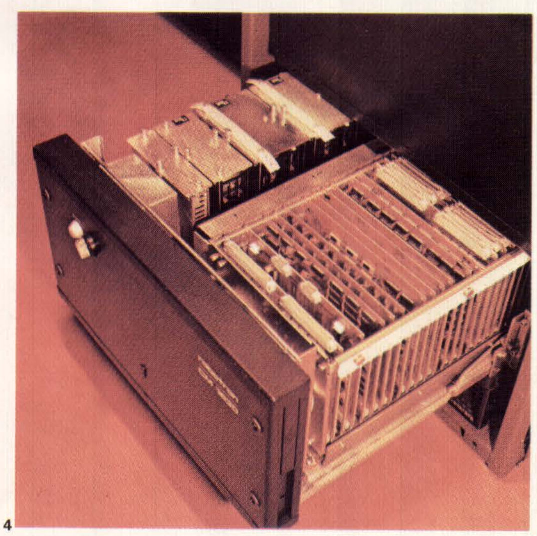
Solution

From a hardware point of view the solution consists in using a robotron A 6402 computer system centrally installed in the district-level supply and service enterprise concerned, and directly (on-line) connected to decentralised robotron K 8931 universal display terminals. To solve the above problem, algorithms and forms of the prospective user have been integrated in the project. The data to be processed is acquired, checked and evaluated decentrally and almost simultaneously, using the universal display terminals mentioned. The data items acquired and evaluated every day are transmitted in batch mode to the robotron A 6402, using teleprocessing facilities. The robotron A 6402 unit will then evaluate all information according to business management aspects. The results obtained are output in printed form (lists) and in machine-readable form (magnetic disks or tape). In addition to general information the printed lists provide information relevant to process management and control, e.g.:

- Consumption of fuel (desired and actual values) and tyres;
- Load kilometres, transport kilometres, road performances;
- Wages (basic pay, extra pay, bonuses);
- Consignor and consignee (territorial assignment);
- Waits and standstill periods;
- Invoices as per causes;
- Maintenance and general overhaul dates.



3



4

Supply of Spare Parts from a District-based Depot to Satisfy Immediate Demands

Problem

Automating disposition and accounting work incurred in connection with the supply of spare parts through a district-level enterprise, involving:

- Actual accounting of inventories and in- and outgoing stock in stores supplying materials and equipment;
- Making out documentation to accompany the goods;
- Distributing goods to consumers according to orders received;
- Determining unsatisfied demands;
- Bookkeeping of goods turnover for follow-up in the accountancy department.

Solution

A robotron A 6402 computer system is to be centrally installed, decentralised operations being done by robotron K 8931 universal display terminals (mainly for data acquisition); robotron K 8912 display terminals (for making dispositions); and printer terminals. All these terminals are directly connected to the robotron A 6402 computer system.

The project realises computer-aided acquisition of spare parts going in and out, using the dialog mode. Disposition and distribution problems are solved on the basis of orders received by taking account of defined funds for specific consumers and goods. Any demand that cannot be satisfied is put on record and kept for subsequent decision-making. The whole turnover of items is recorded in full, with all the documents required for incoming goods, in-plant processes, and outgoing goods being generated automatically. In addition to results obtained from the purely technical execution of the project, there are a lot of data sets that can be directly accessed by executives for them to take appropriate decisions.

The robotron A 6454 Work Station for Design and Technology

On an international scale, rationalisation and automation of production preparation and production proper are becoming more and more important. Above all, design and manufacturing processes are being simplified with the aid of computers. Currently, the application of computer-aided design (CAD) and computer-aided manufacturing (CAM) systems shows an annual growth rate in the order of 38 %, which is above the average. CAD and CAM systems have yielded an average increase in productivity of around 300 %, e.g. in electrical engineering and electronics, mechanical engineering, building construction, plant construction, control engineering, cartography, and the light industries. This makes it clear that the use of CAD and CAM systems on an ever larger scale is an essential prerequisite to achieving higher and better performances in research, development, and production.

VEB Kombinat Robotron supports the intensification efforts of industries by making available appropriate hardware and software. Thus, the robotron A 6454 work station has been developed as a CAD/CAM solution on the basis of the robotron K 1630 microcomputer system.

This work station is designed for rationalising production preparation, constructively and technologically. It is an application-oriented modular system consisting of a robotron A 6402 commercial-type basic computer system (that is, a robotron K 1630 microcomputer with standard peripherals); graphic peripherals (made up of a raster display unit, high-resolution digitiser, and plotter); and basic software, allowing graphic input and output as well as graphic representation and manipulation of geometrical objects.

The graphic basic software has been developed on the basis of the ISO-recommended Graphical Kernel System (GKS)*. It permits the configuration of the work station to be easily extended as to graphic equipment. The interface concept for the geometrical basic software allows easy integration of user-specific programs.

Main applications include:

- Computer-aided design (itemised design included)
- Computer-aided drawing
- Computer-aided planning of machinery and equipment
- Design of variants
- Calculation of parts, constructional groups and complete products
- Computer-aided programming of numerically-controlled machine tools
- Computer-aided elaboration of technological documentation.

The robotron A 6454 work station being an interactive device, users can be guided via dialog and menu functions. This mode of operation particularly meets the requirements of all those engaged in production preparation from a technological point of view.

Software

The software concept of the robotron A 6454 work station comprises the following components:

- The MOOS 1600 modular operating system
- Graphic basic software including
  - the GKS Graphical Kernel System for graphic display and plotter
  - the DIG 1600 progam for the K 6401 digitiser (HDG)
- The GBS 1600 geometrical basic software as geometrical modular system of robotron A 6454
- Problem-oriented software for any purpose
- Application software.

Problem-oriented User Software

The GKS 1600 software permits the robotron A 6454 work station to be adapted to cope with varying design and production-engineering problems which have to be solved in various branches of the economy. It makes development of turnkey CAD/CAM systems possible.

Two applications are described below:

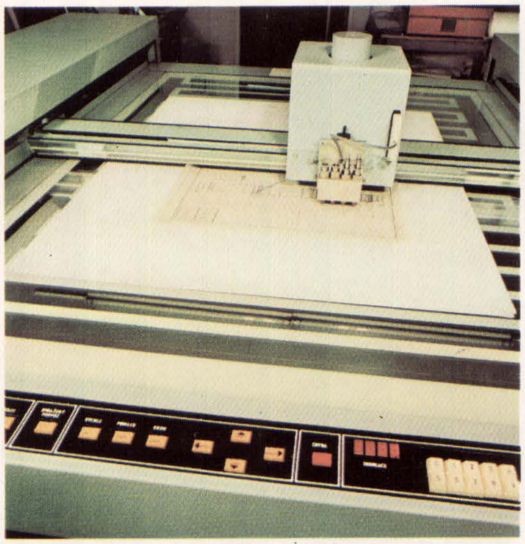
(1) The AUTEVO-ROTA 1 project assists in the design of circular-section components; it is being used to advantage in the machine tool industry. This project covers the completion of detail drawings in line with manufacturing requirements, and of production-engineering documentation; the calculation of individual parts, units, and machines; and the production of punched tapes for numerically-controlled machine tools. Application of the project will bring substantial savings in manual labour and work time, and it will help to improve quality, particularly in production preparation.

(2) The AUTENT-KR project assists in the design of double-curved automotive body components and the production of punched control tapes for NC milling machines used in toolmaking. To begin with, it has been put to use in the motor industry. It is interesting to note that about 80 % of all bodywork outer skins can be designed by the AUTENT-KR project.

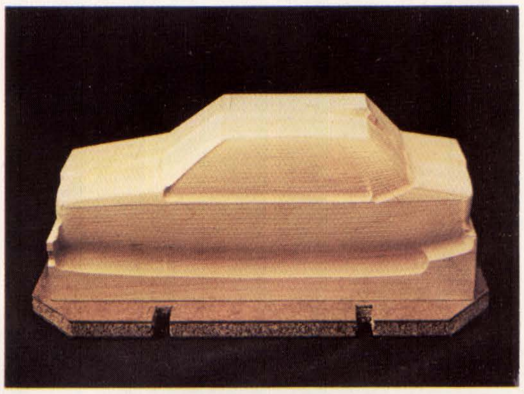
Developments in the field of computer-aided production preparation going hand in hand with the constant upgrading and expansion of both hardware (graphic peripherals included) and graphic software with more extras and of higher efficiency, there are some aspects which are coming more and more into focus, e.g.:

(1) Fully-automated solutions extending from computer-aided design and technological production preparation to high-quality production and enterprise planning.

(2) Workplace-oriented systems with optimised price-performance ratio, operating either as self-reliant units or as components within a comprehensive system.



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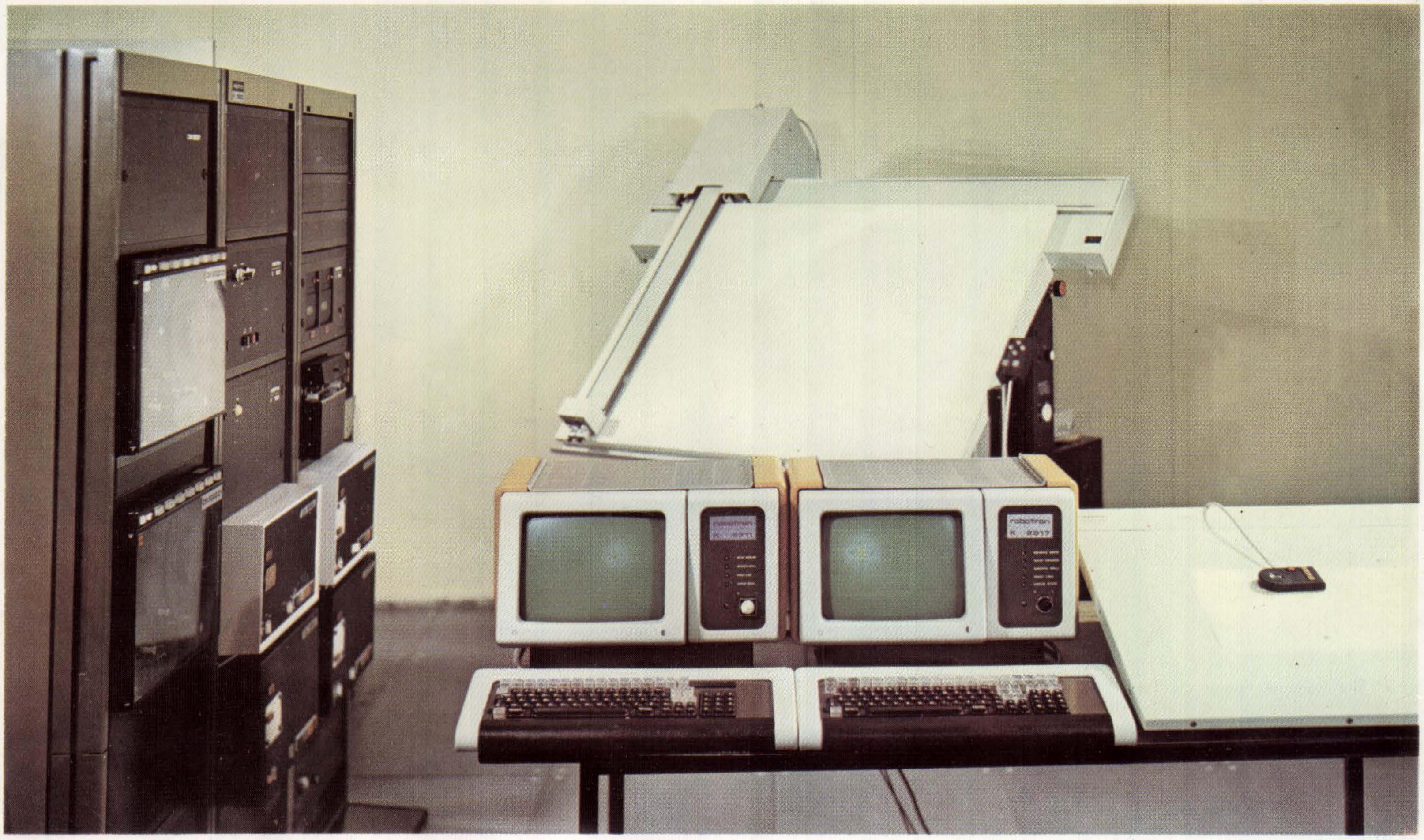
* ISO TC97/SC5/WG2 N 117
Information Processing–Graphical Kernel System (GKS) Functional Description, Version 7.0, 15 Jan., 1982

1 DIGIGRAF 1208/CSSR for sophisticated graphic representations

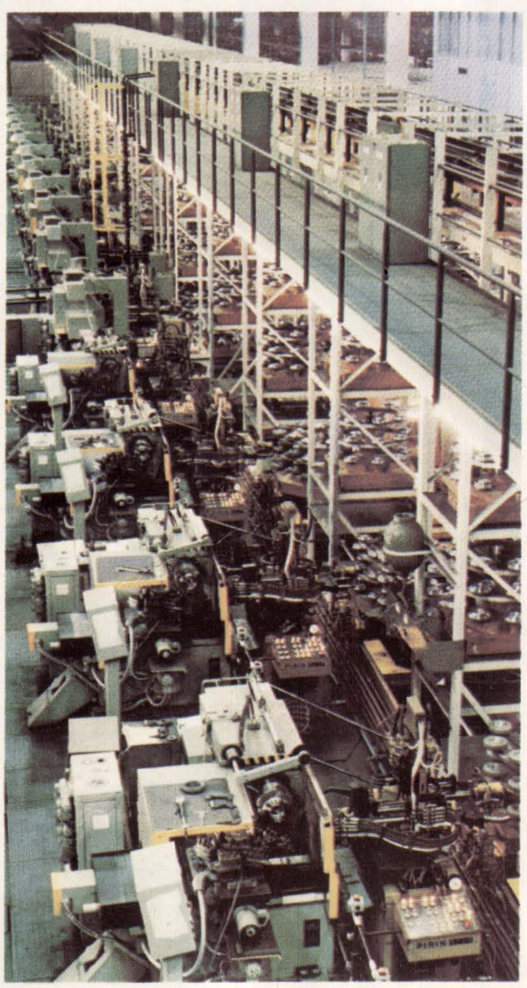
2 The DKF 1600 program package assists in the design, calculation and manufacture of double-curved automotive body components.– Car body developed on the basis of the DKF 1600

3 The robotron AKT A 6454 work station for design and technology has been developed as a CAD/CAM solution

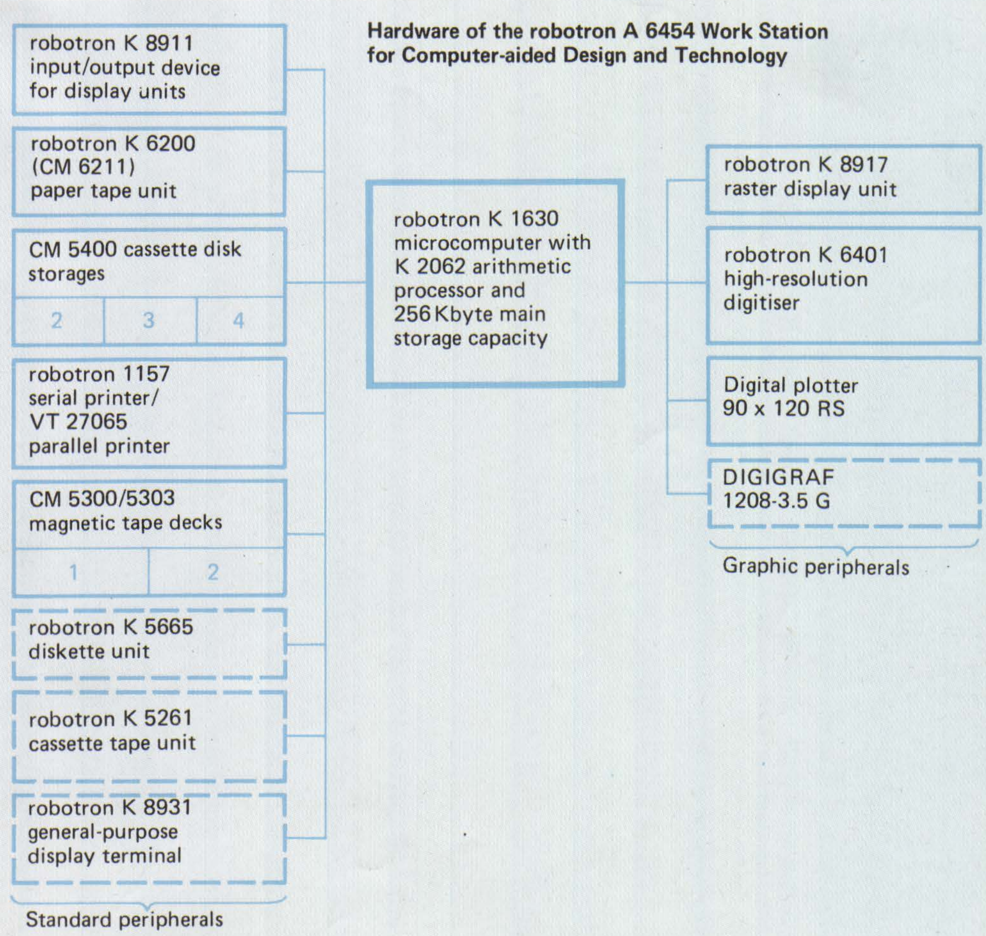
4 Design and production of circular-section components with the aid of the AUTEVO-ROTA 1 program package



3



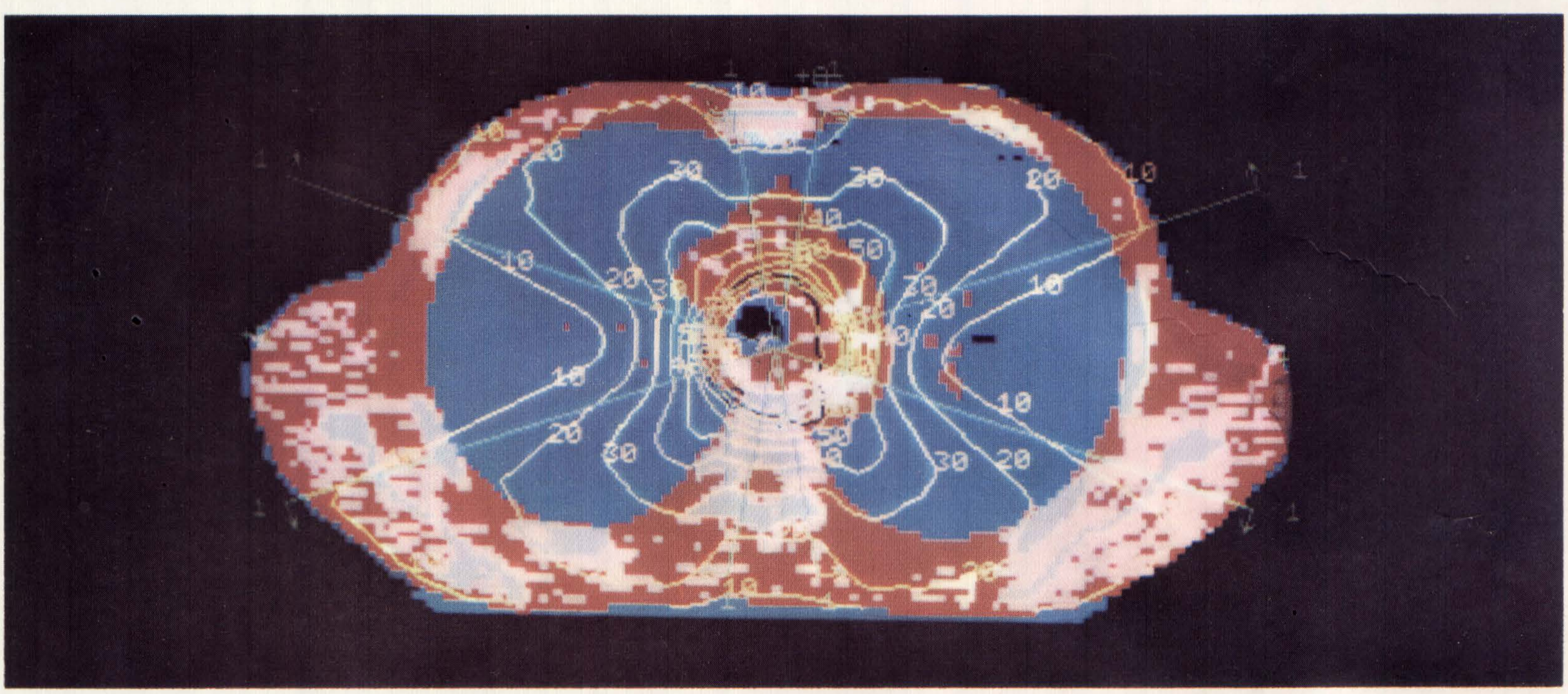
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Microelectronics in Medicine



1



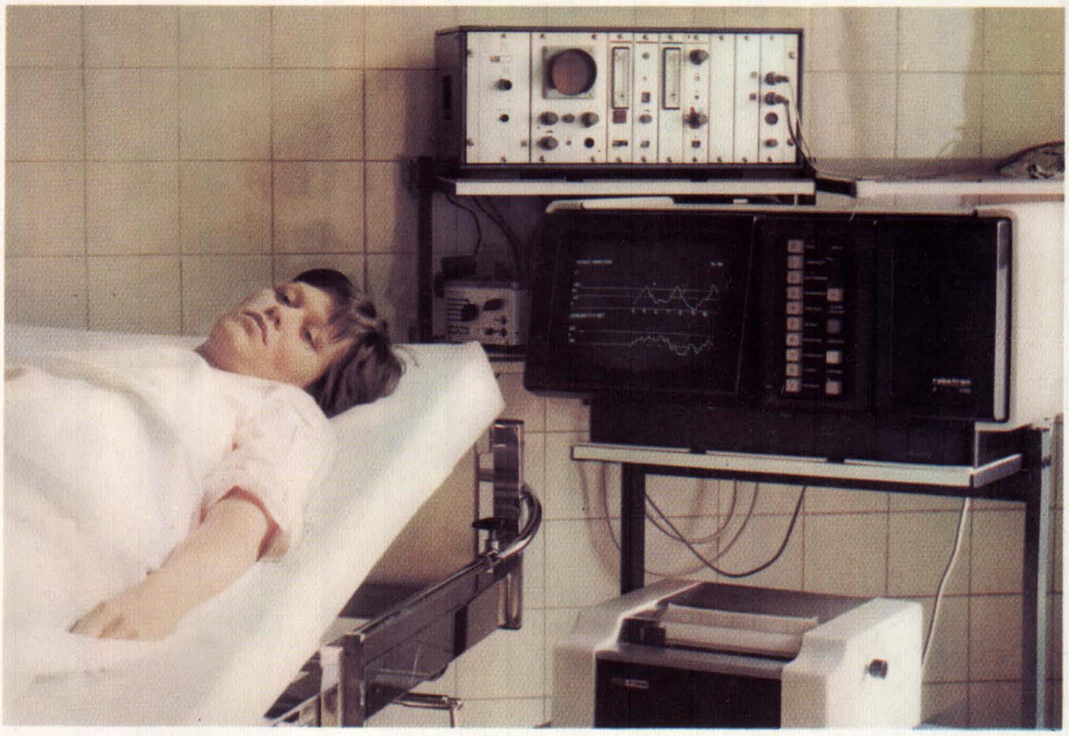
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1 Operating special peripherals of the robotron DOPSY system at the Central Institute for Cancer Research at Berlin-Buch

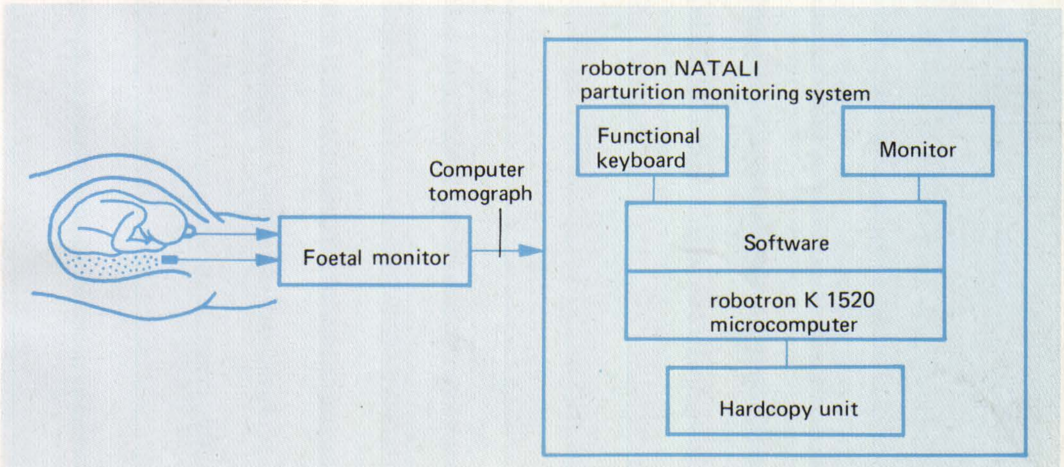
2 Computer-tomographic cross-section displayed on a multi-colour monitor of the robotron DOPSY system as a clue for pendulum-type irradiation treatment of an oesophagus carcinoma

3 and 4 robotron NATALI gives the obstetrician a comprehensive survey of the parturition procedure

3



4



The far-reaching area of health service comprising medical research, medical training and the clinical practice proffers suitable conditions for the application of microcomputer systems. Medical research and development work can be made much more efficient by means of modular computer hardware. Robotron provides effective solutions for the practical application in clinics, hospitals, and doctors' practices. The direct co-operation between medical research teams and specialists developing computer hardware and software has turned out to be well-proven. Top priority has been attached in this connection to such fields of application as

- biosignal processing and patient monitoring,
- hospital administration and automation of routine work as well as
- computation-intensive therapy preparation.

The following system solutions are applied in medical practice:

(1) robotron NATALI parturition monitoring system
(2) ROMEDO medical information system
(3) robotron DOPSY irradiation scheduling system.

robotron NATALI Parturition Monitoring System

The robotron NATALI system represents a solution jointly developed by a research team of the women's hospital of Friedrich Schiller University in Jena and the Centre of Research and Technology of VEB Kombinat Robotron. Many years of medical basic research work at Jena university have yielded new findings in the evaluation of the still unborn child within the parturition phase. With the aid of a microcomputer, the heart frequency of the unborn child and the mother's intra-abdominal pressure are computed and evaluated. The required biovalues are entered into the microcomputer from a foetal monitor. Being directly placed beside the bed, the NATALI system monitors the parturition procedure and provides an objective evaluation via the display. Critical situations occurring during the intranatal period are immediately recognised and indicated visually and audibly.

If the computed constitution of the unborn child is found to be a pathological one, the system indicates: The termination of the parturition must be considered! The information provided by the robotron NATALI system equals in its value the experience of a proficient physician. Additional information such as applied medicaments, width of the os uteri, etc., affording the physician a comprehensive survey of the parturition procedure, are keyed in via the keyboard in the dialog mode of operation. The system is easy to use and does not require any special knowledge of electronic data processing. The entri stock of data remains in store right up to the end of the delivery. It is put out through a printer in the form of a protocol describing the progress of parturition. This protocol is referred to as partogram. The parameters "foetal constitution" and "uterus activity" (indicated in Montevideo units) are presented as a clearly arranged diagram in their temporal procedure. Thanks to the robotron NATALI system, awkward situations threatening the unborn child can be recognised in due time and precautionary measures taken. Therefore, this system is especially recommended for cases of risk deliveries. The robotron NATALI system is intended to help the physician in decision finding and to relieve the medical staff of routine work, thus enabling care for mother and child to be improved.

ROMEDO Medical Information System

A system solution for improving patient care and for streamlining organisational procedures at medical establishments has been developed by VEB Kombinat Robotron in close co-operation with the Central Institute for Higher Education and the Institute for Social Hygiene of the German Democratic Republic.

An extensive orgware package (collection of organisation solutions) excellently suitable for an all-out primary organisation comprises the following eight complexes:

- Patient file
- Long-term patient file
- X-ray diagnosis registration
- Electrocardiogram

5 The robotron A 5120 office computer being used as part of the ROMEDO information system, X-ray diagnosis registration section



5

The special-purpose peripheral devices of the K 1630 microcomputer ensure an easy operation requiring no in-depth computing knowledge. The digital information about the patients as well as the ray treatment facility are keyed in via the keyboard. The analog data such as the number and cross-section of the patients to be treated, location of the tumor, areas to be protected and transaction data, are input by means of digitised units. The information about dose and dose distribution to be computed with the help of an algorithm according to the cross-section of the patients are displayed on a graphic multi-colour monitor. By using the displayed values (isodoses), the physician and the physicist, respectively, can recognise if the aim of a ray therapy–destruction of the tumor cells as completely as possible yet simultaneously preserving to the highest degree possible the adjacent sound tissue–has been accomplished. The computation has to be repeated, by modifying the physical input values, until an optimum schedule is achieved (visual optimisation). This system also permits computerised optimisation. The optimum ray treatment schedule is put out on the graphic two-colour printer and serves as the valid document for subsequent ray treatment of the patient.

The robotron DOPSY irradiation scheduling system has jointly been developed by the Central Institute for Cancer Research affiliated to the Academy of Sciences of the GDR, Berlin-Buch (ZIK), and the Centre for Research and Technology which forms part of VEB Kombinat Robotron, Dresden, and is applied in hospitals.

diagnosis registration
- Appointment and care registration
- Clinical record statistics
- Epicrisis
- Time-schedule control.

By using standardised texts which are frequently applied in medicare it has further been possible to streamline some parts with the aid of the A 5120 office computer.

In the fields of X-ray diagnosis registration, ECG diagnosis registration and medical recording by the physician, the appropriate programs are available. All components of the orgware and the software solutions are self-contained subsystems which can also be used separately. The programs are available in higher programming languages. Special users' requests can easily be satisfied and integrated into the programs. The operator's work is guided via the display. It is clearly arranged and ensures a safe application of the system. The operator needs no expert knowledge of the computer technology. The user is relieved of much cumbersome paperwork thanks to the system, thus making possible an up-to-day posting of the diagnoses compiled.

robotron DOPSY Irradiation Scheduling System

In radiation treatment patient-oriented radiation scheduling has proved necessary worldwide. With the robotron DOPSY irradiation scheduling system VEB Kombinat Robotron offers a well-proven interactive system which takes into account all ray treatment techniques applied in medical practice as well as the usual types of rays, and the combinations of the various types of rays and energies.

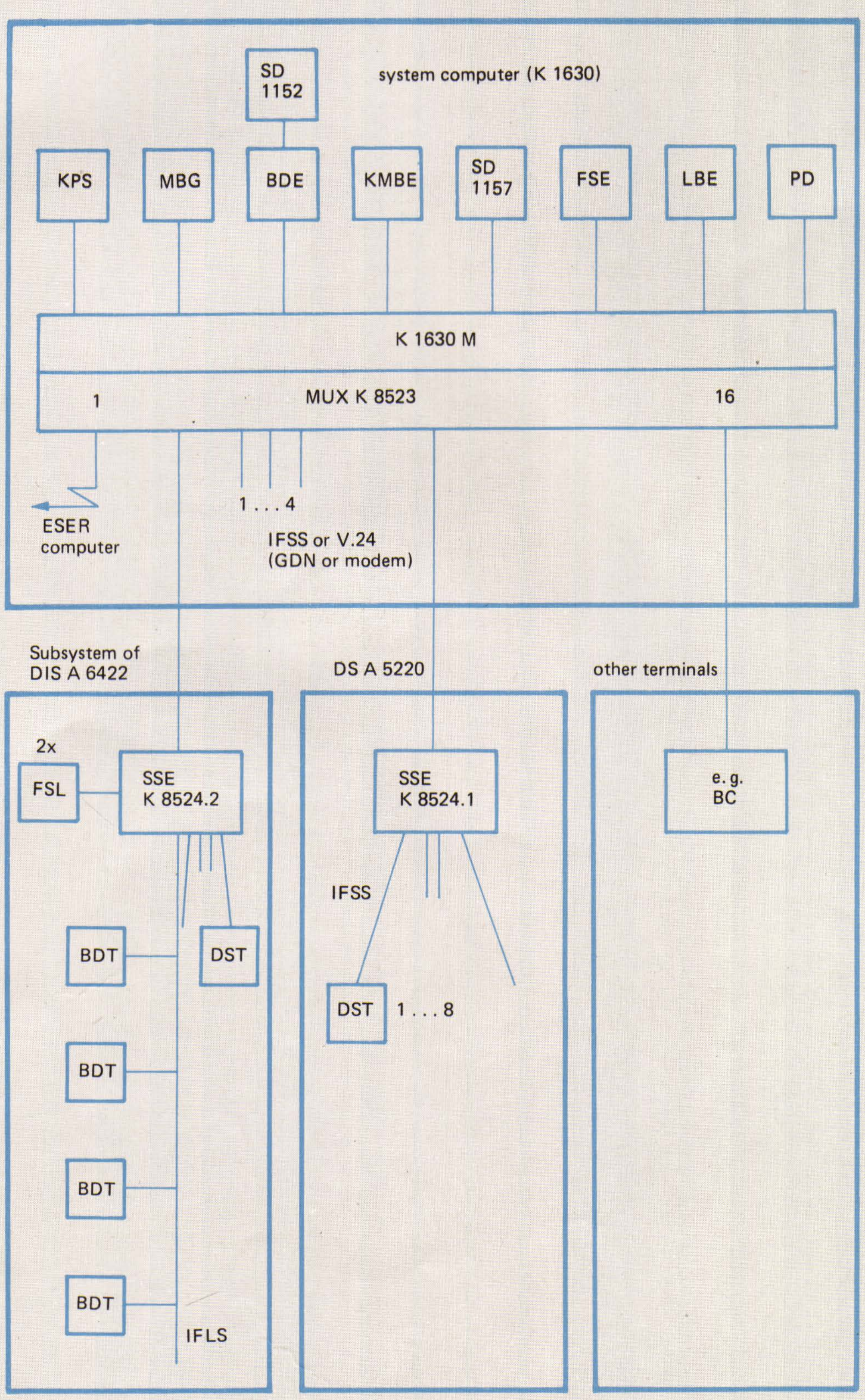
This system is distinguished by a remarkable ease of operation rendered possible by a multiplicity of computational options.

★

In addition to the three system solutions described above, there are medical applications galore still being developed with the aid of microelectronics which will be introduced in practice within the next few years.

Data Entry, Collecting and Processing Systems

Survey of the A 6422 data and information system



Key:

KPS – disk cartridge storage	GDN – local data transmission
MBG – 1/2" magnetic tape storage	BC – office computer
BDE – operator console	SSE – system controller
SD – serial printer	DST – K 8913 dialog terminal
FSE – floppy disk storage	BDT – operating data terminal
LBE – punched tape unit	IFLS – line interface
PD – parallel printer	IFSS – star interface
MUX – multiplexer	FSL – floppy disk drive

Instantaneous, simple, fast and low-cost entry of vital data for processing by a computer on the basis of interactive communication is becoming an increasingly critical factor for efficient business management.

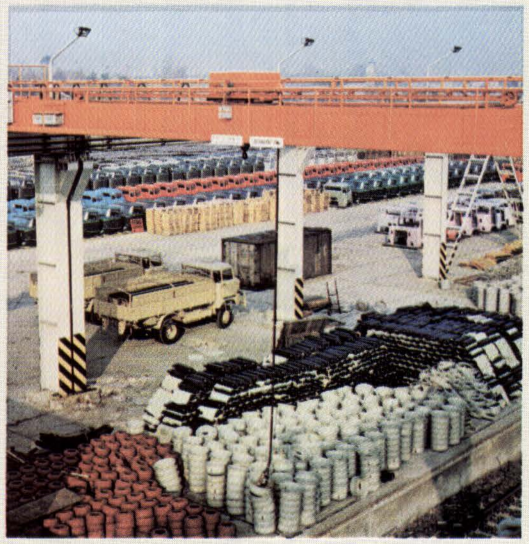
The data and information systems offered by VEB Kombinat Robotron afford simple solutions to the problem of data entry, collecting and processing for even the most complex structures of large enterprises.

robotron A 6422
Data and Information System

The adjacent graph shows the system set-up of the robotron A 6422 data and information system for the acquisition and processing of specific business and production data.

The set-up of robotron A 6422 reveals that terminals of differing configuration can be connected to a maximum of four system controllers which function as concentrators for the connected terminals. The location of the four system controllers is freely selectable. Computerised processing is ensured by the K 1630 central microcomputer (or an alternative 16-bit microcomputer), the concentrators and the terminals. The system has been designed in such a manner that subsystems remain operable in the event of a breakdown of the central hardware. Data transmitted by the terminals is temporarily stored for the duration of the failure.

Two different types of terminals have been conceived for operation in the production sphere.



The robotron A 6422 data and information system ensures efficient control of storage and transport capacities, etc.

robotron K 8901
operating data terminal



The robotron K 8913 data terminal is a CRT display station suitable for the production manager, dispatcher and foreman, or for operation at points of frequent interactive communication (e.g. file interrogation).

The second is the robotron K 8901 operating data terminal. It is of simple and robust design for at-source data entry, i.e. entry directly at the production machines or plants.

The robotron K 8901 operating data terminal consists of a 16-digit alphanumeric display, a 10-key and control keypad, and a functions-selecting keypad that can be programmed for specific applications.

Other optional ancillary units include a badge reader (storage capacity: 17 or 38 characters), magnetic card reader (storage capacity: up to 40 characters), punched card reader (80-column cards), and the robotron K 6311 dot-matrix printer (100 ch.p.s.).

A digital input/output interface permits automatic logging of production data, measured values and other magnitudes so that measured variables transmitters, weighing machines, simple controllers and other devices can be connected for automatic input and output of selected operating data.

The use of badges or label cards is a particularly convenient way to enter data quickly and reliably. This technique is employed in many sectors of the economy.

The robotron A 6422 system is available in many different configurations. It is backed by suitable software packages to deal with a variety of routines involving the use of:

- Production monitoring and control systems
- Inventory control systems
- Personnel data systems
- Information and evaluation systems
- Data collecting systems.

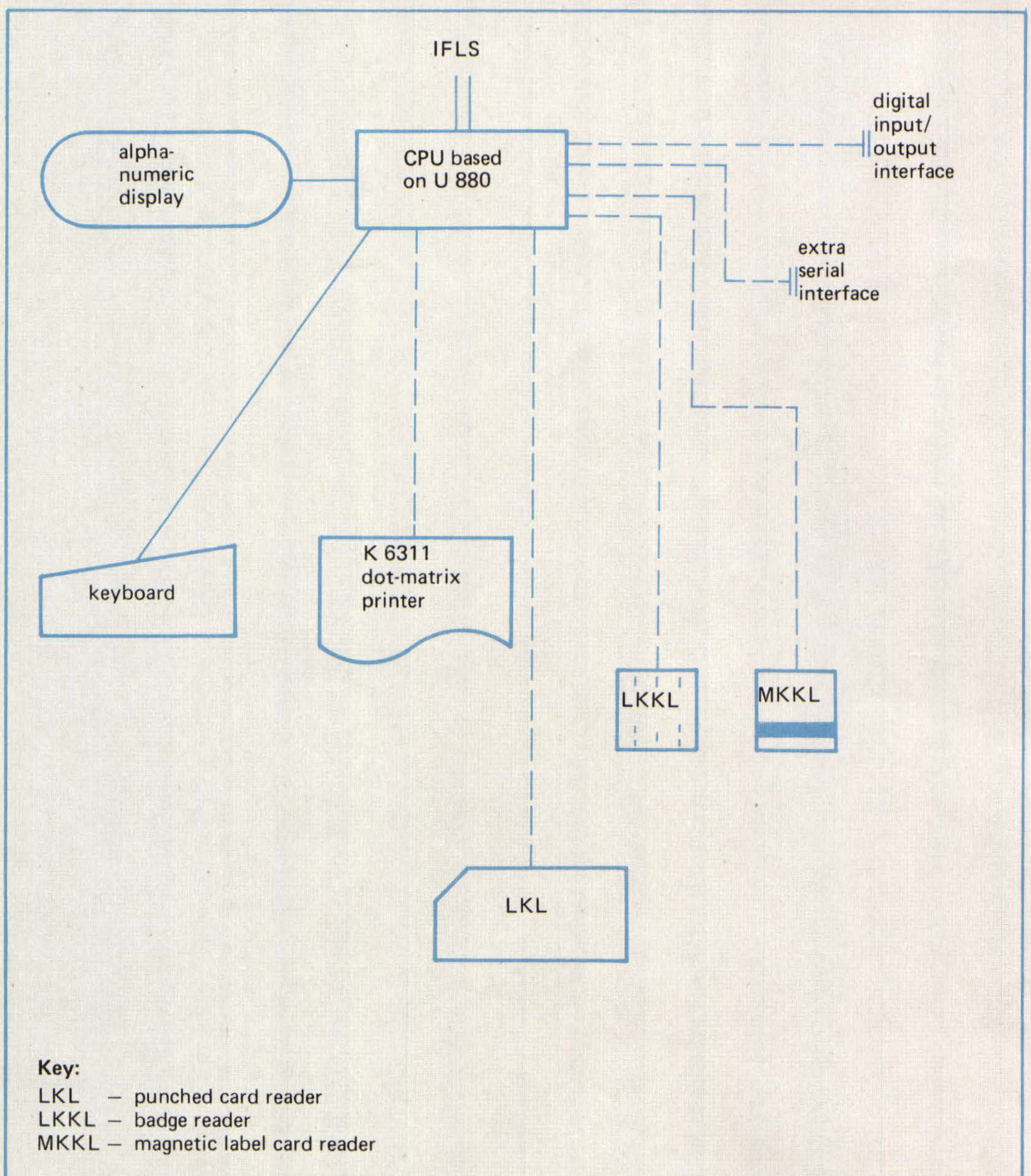
The range of jobs handled by such systems includes:

Acquisition of
quantities, weights, lengths, measured variables, states, causes of troubles, machine and manpower times, canteen data, petrol filling data, pay data.

Monitoring of
course of production, flow of materials, production orders, lot sizes, schedules.

Administration of
stock, job and material confirmations, transport capacities, tools.

Monitoring of



Survey of the robotron K 8901 operating data terminal

job progress, production notifications, termination notifications, clearance of orders, job changes, attendance lists, access authorisation.
Information on
states of jobs, schedules and production progress, quality vetting, identity, capacity condition, transgression of nominal states.

Modular Data Preparation and Evaluation System

The modular data preparation and evaluation system designated MODAS 6422 is used to streamline user program building.

Its consistent modular structure gives MODAS 6422 a wide application area. This ensures that the installed hardware can be optimally used, and that project engineering work for program packages of users is substantially reduced (by as much as 50 %). MODAS 6422 can be operated also on alien data collecting systems and computers.

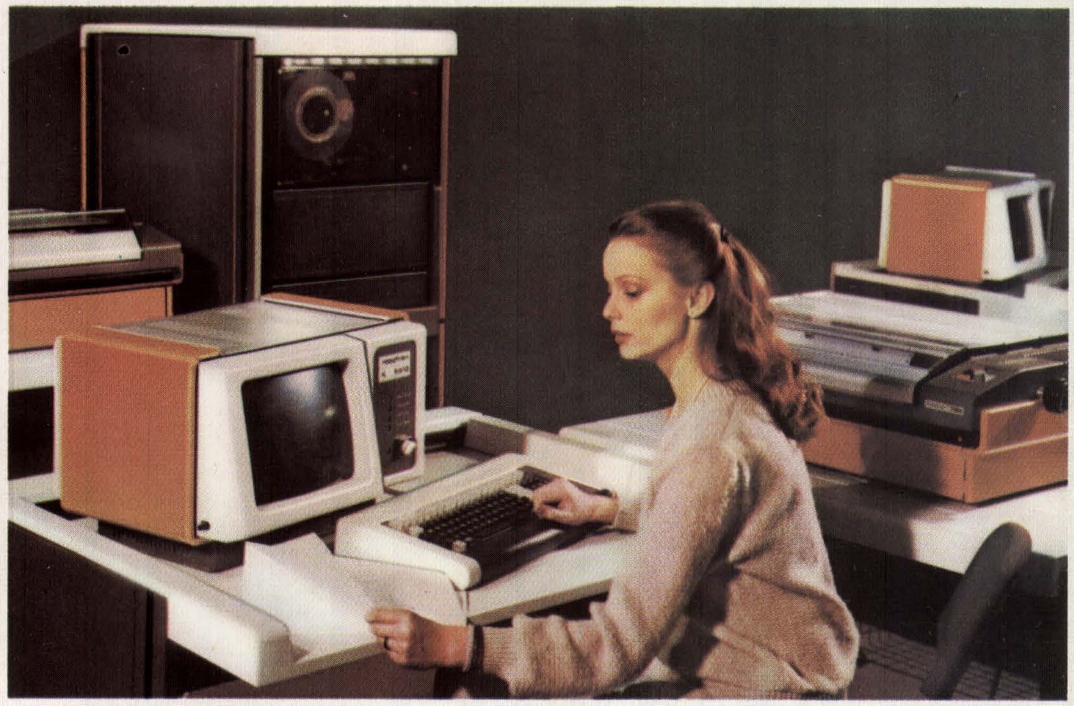
robotron A 5220 Data System

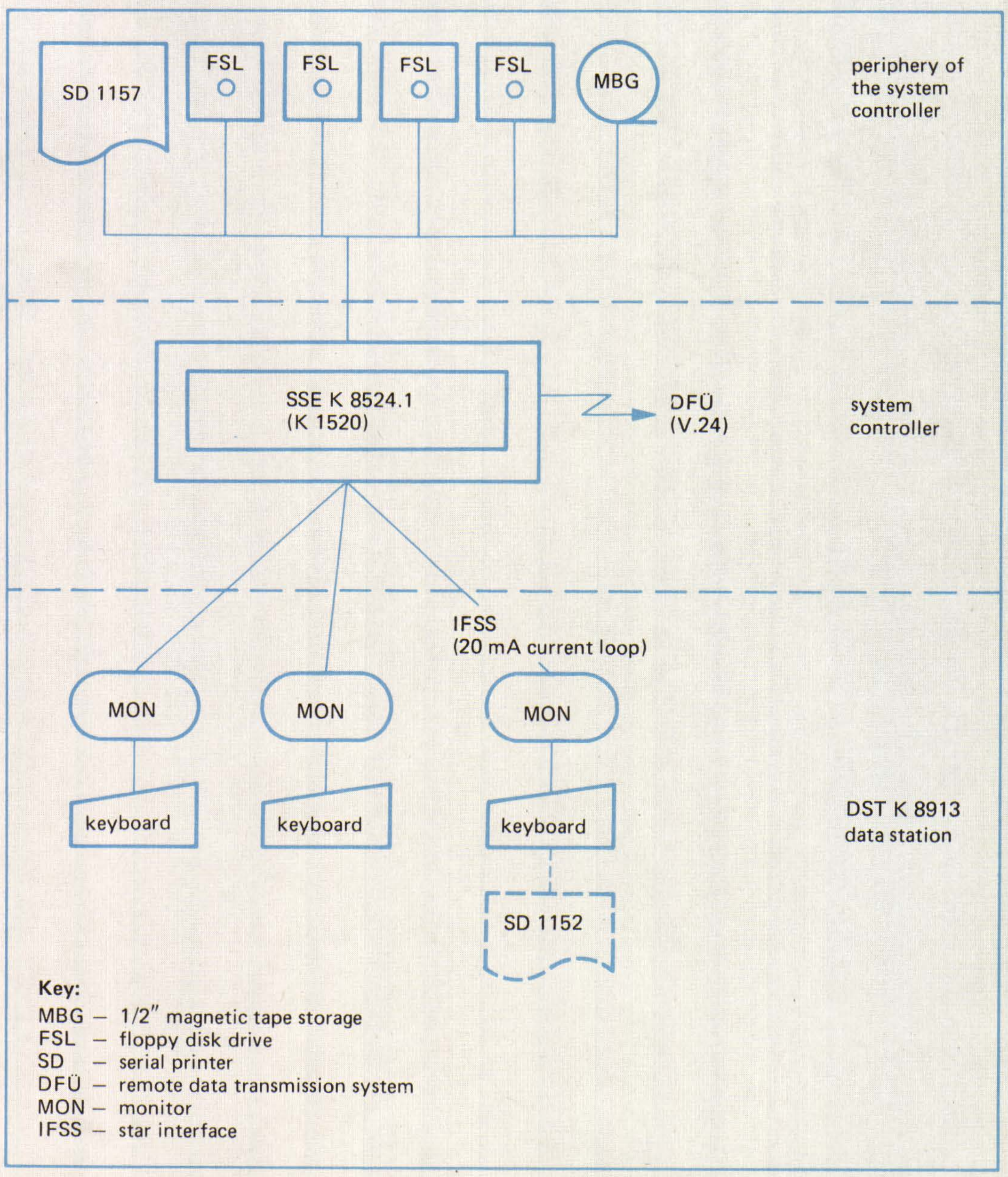
The robotron A 5220 data system can be integrated as a subsystem in the A 6422 data and information system. It was developed to simplify data entry and data collecting routines since these hold a key position in data processing as a whole.

It is an economical proposition wherever conventional data acquisition systems based on punched cards or punched tapes are to be replaced (e.g. in computer stations).

The robotron A 5220 data system also works autonomously. Data can be entered, verified and prepared on a maximum of eight data stations of the K 8913 type. The data can be optionally stored on floppy disks, or on magnetic tapes (compatible with the Unified Computer System operated by the CMEA countries), or they can be transferred for output via a V.24 interface. An extra program package is available to process the collected data outside the actual acquisition process.

robotron A 5220 data system

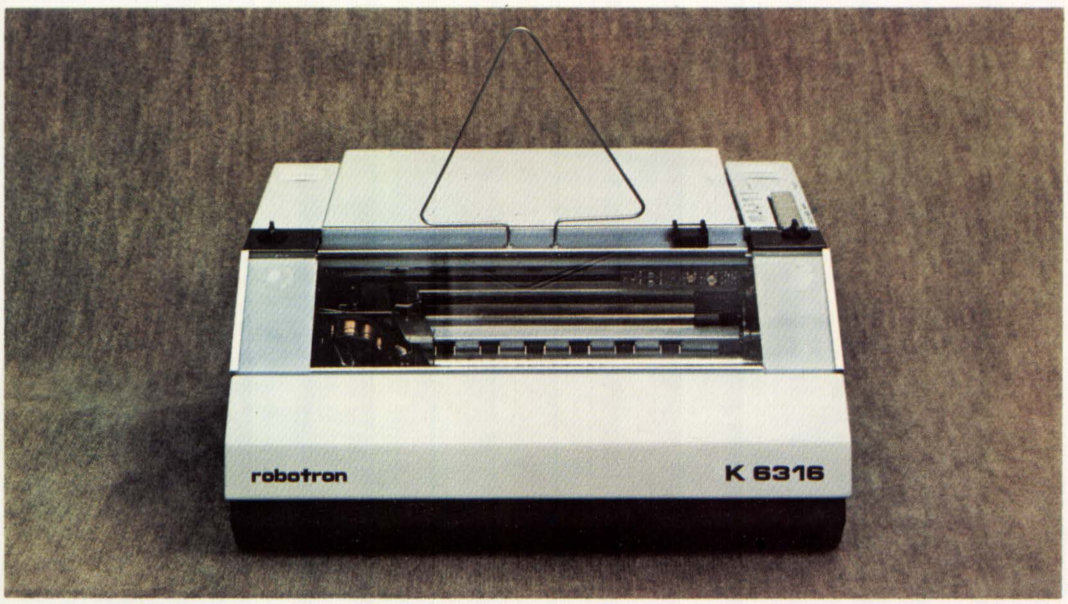




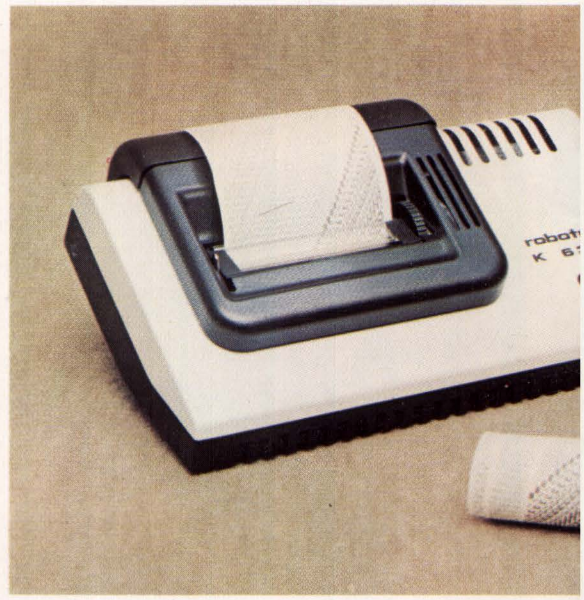
Survey of the robotron A 5220 data system

OEM Supplier with Long-standing Experience

Printers–A Major Line in OEM Marketing



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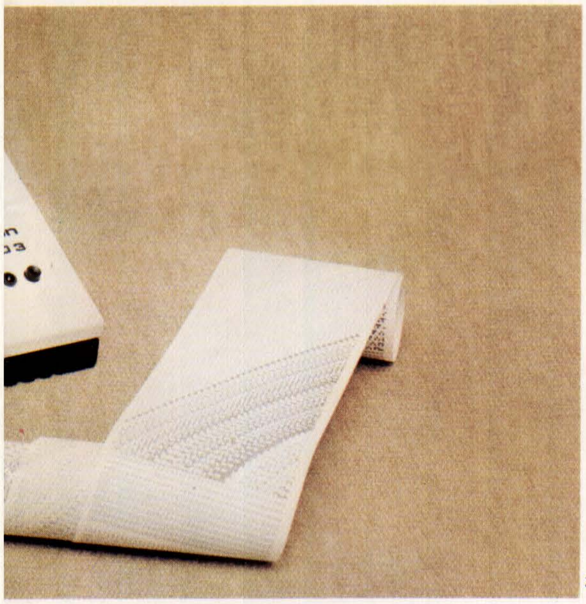
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1 robotron K 6316 counter printer

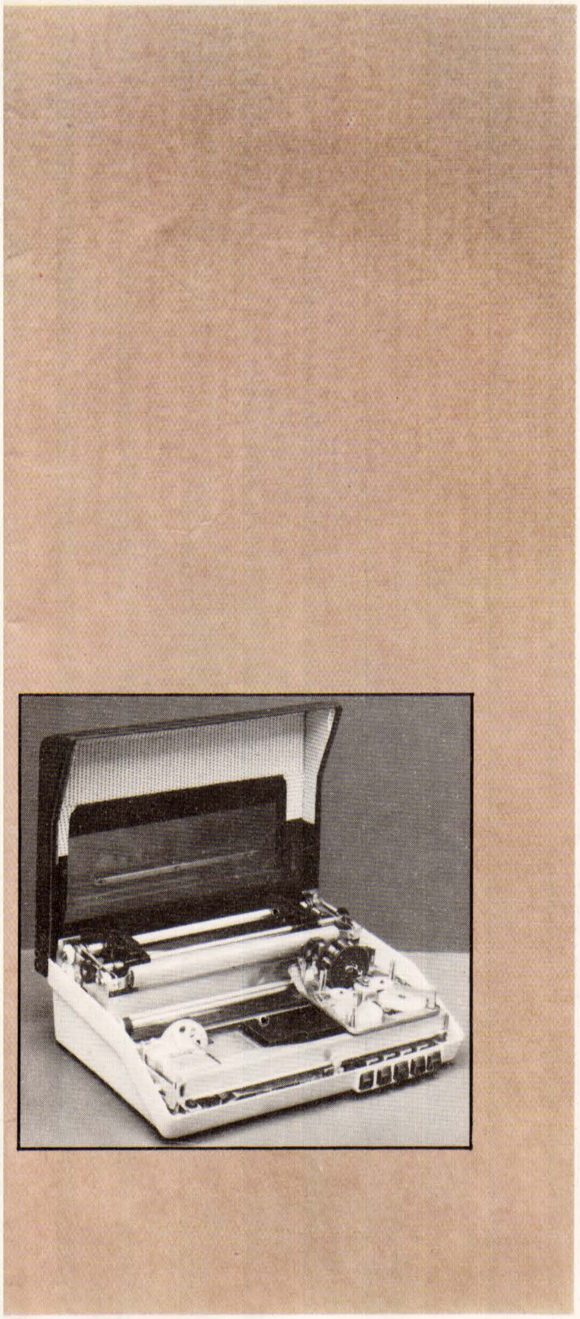
2 robotron K 6303 thermal printer

3 Models robotron K 6311 and robotron K 6312 of the robotron K 6310 family of stylus printers

4 Model robotron K 6311



2



4

VEB Kombinat Robotron can claim many years' experience in the production and marketing of efficient peripheral devices, assemblies and single components, all of which coming under the category of OEM business.

OEM business offers the manufacturers of complete edp systems the invaluable advantage of not having to break down their research and development capacities to deal with a diversity of single parts and assemblies. The OEM producer, on the other hand, is able to specialise and concentrate in a much greater measure on development work and on streamlining production to achieve the highest possible efficiency standards.

This division-of-labour is obviously to mutual advantage so that it is easy to predict a booming future for OEM business.

The OEM sales programme of VEB Kombinat Robotron includes the following devices, units and assemblies:

- Printers of differing capacity and based on differing printing principles
- Diskette drives and disk storage units
- CRT display, operating data, banking and counter terminals
- Read/write units for plastic badges with magnetic strips
- Power supply modules, stepping motors, keyboards, magnetic heads.

VEB Kombinat Robotron offers a great diversity of printers, including models based on the mechanical typewheel and stylus printing principles, and on the non-mechanical thermal printing principle. The internationally proven robotron 1156, robotron 1154 and robotron 1157 printers were supplemented in 1983 by the robotron K 6310 family of stylus printers. The constructional concept of the K 6310 series follows international trends in terms of operational variability and simplicity, and service-optimised design. This has secured them a wide application area as hardcopy printers, counter printers, and output printers of office computers and microcomputers.

All models print at a rate of 100 characters per second, but they differ by the following features:

K 6311: hardcopy printer with a printing width of 80 characters

K 6312: hardcopy printer with a printing width of 132 characters

K 6316: counter printer with a printing width of 80 characters.

Other features include: 9×7 dot matrix; printer travel optimisation; normal, broad and italics typestyles; weight 6 or 9 kg; comprehensive forms system; ribbon reel or cartridge; V.24 (RS 232C) or Centronics (8-bit parallel) interfaces.

The robotron K 6320 family of stylus printers has been designed for a printing speed of 200 characters per second.

Recent years have seen the replacement of the traditional typelever system of printing by the modern typewheel because the latter is faster, more reliable, and quieter, and it simplifies typestyle changing by the user which is completed in a matter of seconds. That is why typewheel printing is finding increasing favour.

With an output speed of 40 characters per second, the series of typewheel printers made by VEB Kombinat Robotron represents an efficient solution in this medium-capacity class. Although the printers are based on a common mechanical principle, they vary as regards their design to fulfil differing user requirements.

robotron 1152/251

Having a print width of 132 characters, this output printer is intended for VDU-oriented office computers and terminals. Its high print quality makes it particularly suitable for word processing systems. A comprehensive forms system is available for versatile operation in a wide application area.

robotron 1152/252

This model in the 1152 family features the same constructional and technological design, but it differs from its 251 sister model inasmuch as it has a print width of 210 characters. This fulfils the demands of those who wish to have a double width to accommodate two forms side-by-side. Hence, the 252 printer was primarily conceived for forms-oriented office computers. It is supplied in two versions–as a tabletop unit and as a module for incorporation in computer hardware.

In the non-mechanical range of printers, VEB Kombinat Robotron offers two types of thermal printers. Model robotron K 6301 is a well-established thermal strip printer with a print width of 16 characters per line. Model robotron K 6303 is a modern thermal dot-line printer with a capacity of 40 characters per line and a printing speed of one line per second. The robotron K 6303 thermal line printer is used mainly in process control and data logging systems, for minicomputers, microcomputers and in special-purpose terminals.

Increased Efficiency through Electronic Typewriting

In addition to portables, mechanical and electric office typewriters, all of which have stood the test on all continents, VEB Kombinat Robotron produces electronic typewriters of varied specifications to meet a wide variety of requirements.

Common Features

The new electronic typewriters differ from their predecessors already in their outer appearance. A striking feature is their up-to-date, flat keyboard comprising just a few, clearly arranged, function keys allowing an immediate, uncomplicated transition from a mechanical or electric model to an electronic model.

For the first time, Robotron typewriters come with a fixed platen. A type wheel containing 100 characters moves along the platen. This mode of typing ensures a high-quality typewritten product and a low-noise key stroke–even if several carbon copies and a high typing speed are involved. The type wheel is easy to exchange so that various styles and sizes of type can be applied. The machines now feature ink-ribbon cassettes rather than the conventional ink-ribbon spools. Due to their convenient use, the various types of inked ribbons can swiftly and cleanly be replaced and properly used in accordance with requirements.

The upgraded correction facilities are extremely convenient. Correction slips as well as correction fluids can entirely be dispensed with as each typewriter is now equipped with a special correction ribbon. Typing errors are completely eliminated by means of the lift-off or cover-up procedures, and this holds true not only for instant corrections (by pressing the appropriate key, the last-typed character is automatically erased). In line with the system's storage capacity, the correction memory enables each character to be eliminated by depressing the appropriate key. With the help of the relocate function, which is a common feature on all Robotron typewriters, the typing mechanism relocates the original position after each correction. By merely pressing the relocation key, the next new letter is found without any further shifting. The correction ribbons can also readily be replaced–exactly like the inked ribbons.

Robotron electronic typewriters also stand out for their minimum service requirements. The electronic system allows the rapid replacement of faulty assemblies on the customer's premises which helps to reduce downtimes considerably.

robotron S 6005
Electronic Compact Typewriter

This is the smallest model among the electronic typewriters from Robotron. It is widely applied wherever the larger office machines are not used to capacity, or as back-up typewriter in the office as well as in smaller or medium-scale enterprises. The robotron S 6005 model excels by quite a number of very practical functions, e.g., automatic paper feed, flowing text (automatic carriage return along with line spacing at the end of a line), tabulator and decimal tabulator, as well as the continuous typing function for all keys. A correction memory comprising 170 characters enables a flawless typescript to be produced. The robotron S 6005 model is small, easy-to-use and handy so that it can be placed virtually anywhere.



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robotron S 6009
Electronic Standard Typewriter

This model has been designed to satisfy higher demands as to quality and quantity of the written matter. It is especially suited for those offices where typewriting is done aperiodically, as well as for semi-professional use. Four different spaces between characters (10, 12, 15 characters per inch, proportional spacing) ensure an individual layout of the text matter. Text passages can be rendered prominent by means of spaced-out typing and automatic simultaneous underscoring. The robotron S 6009 model has also been equipped with a one-line correction storage unit.

robotron S 6010
Electronic Standard Typewriter with V.24 Interface

This typewriter model has been designed for universal application at decentralised typists' workplaces. The automatic correction facility is based on a correction memory with a capacity of 200 characters.

The robotron S 6010 is optionally available with a V.24 serial interface and thus capable of being used as a data receiver. It has application both as an ordinary typewriter and an elegant-style printer.

The robotron S 6010 "bilingual" variety, as it has aptly been named, enables two different written languages to be typed on the same sheet without difficulty, even if different directions of carriage travel are involved.

robotron S 6011
Electronic Office Typewriter

This model constitutes a convenient electronic office typewriter complete with a storage back-up which can generally be employed at any typing workplace. In addition to its 200-character correction storage facility, this model includes a

1 robotron S 6010
electronic standard typewriter
2 robotron S 6005
electronic compact typewriter
3 Type wheel (front and rear view) of an electronic typewriter made by Robotron
4 robotron S 6009
electronic standard typewriter

constant-values store. Frequently repeated text passages can be stored in it, and all one has to do is to press the relevant key in order to insert quickly and flawlessly the required standard text in the desired place. The free storage capacity still available as well as the used-up capacity are indicated on an eight-digit display screen. Moreover, the typing and tabulator positions are displayed, and operating errors are pointed out. There is no further bothering about complicated formats or frequent format changes as all this is taken care of by four format storages.

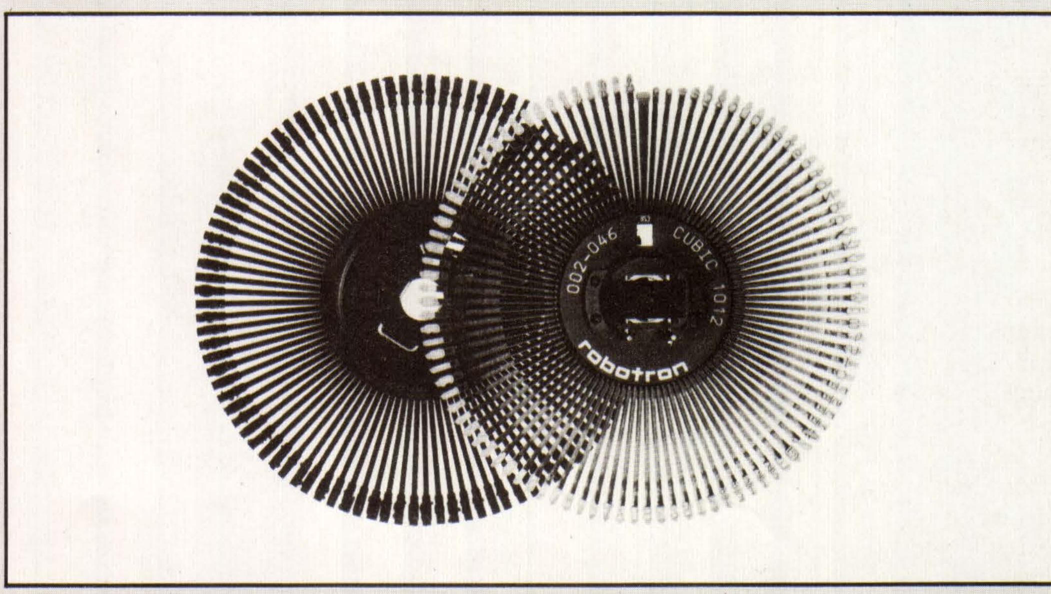


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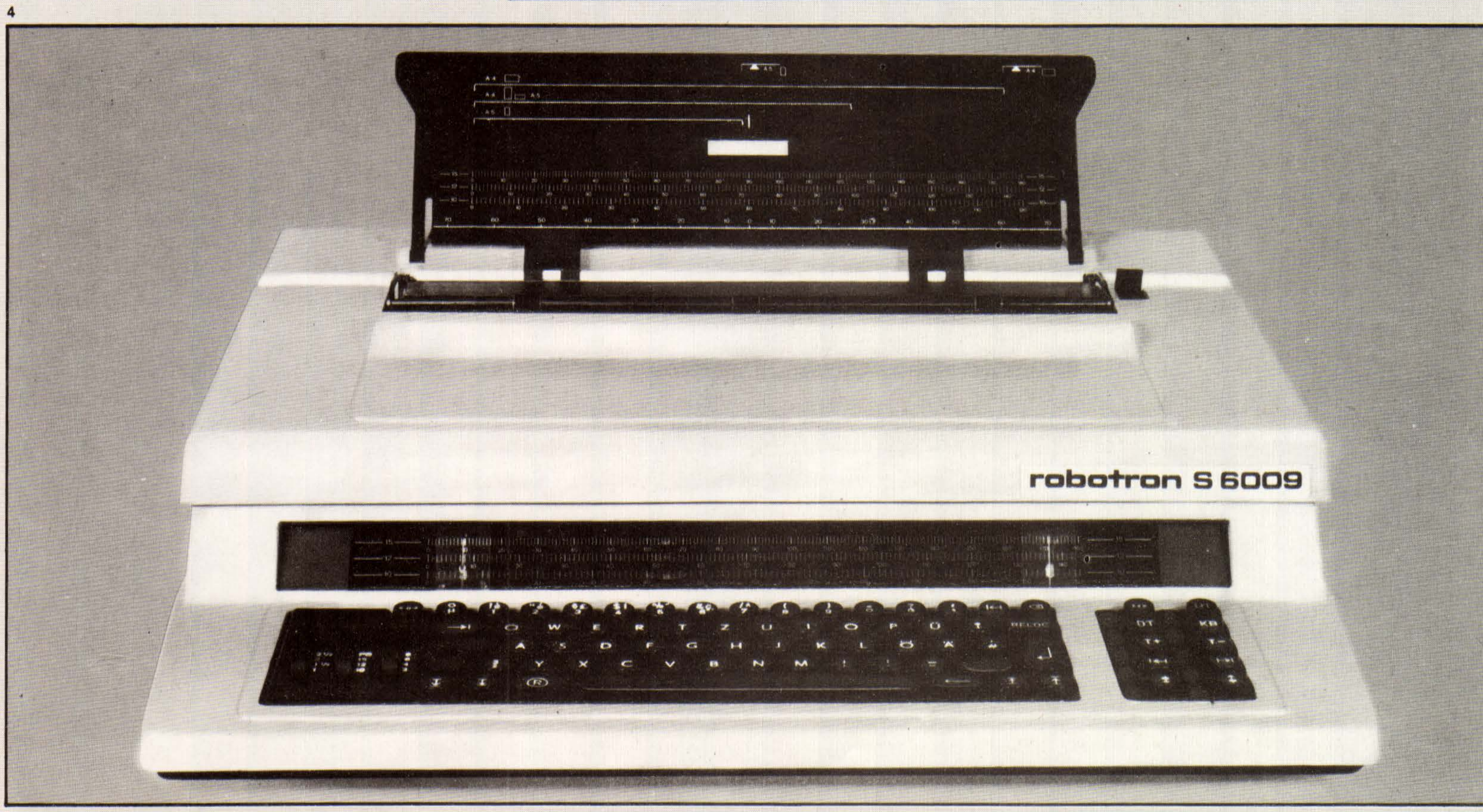
robotron A 5310 Electronic Typing System

Where frequent text alterations and a repeated type-out are required, special-purpose systems involving display-oriented text processing will do the job most proficiently. The robotron A 5310 electronic typing system fully copes with these demands. The input text appears first on a screen and is only subsequently output on paper in its final form. Texts or text passages which are repeatedly needed can be stored on floppy disks (40–50 A4 standard pages per floppy disk).

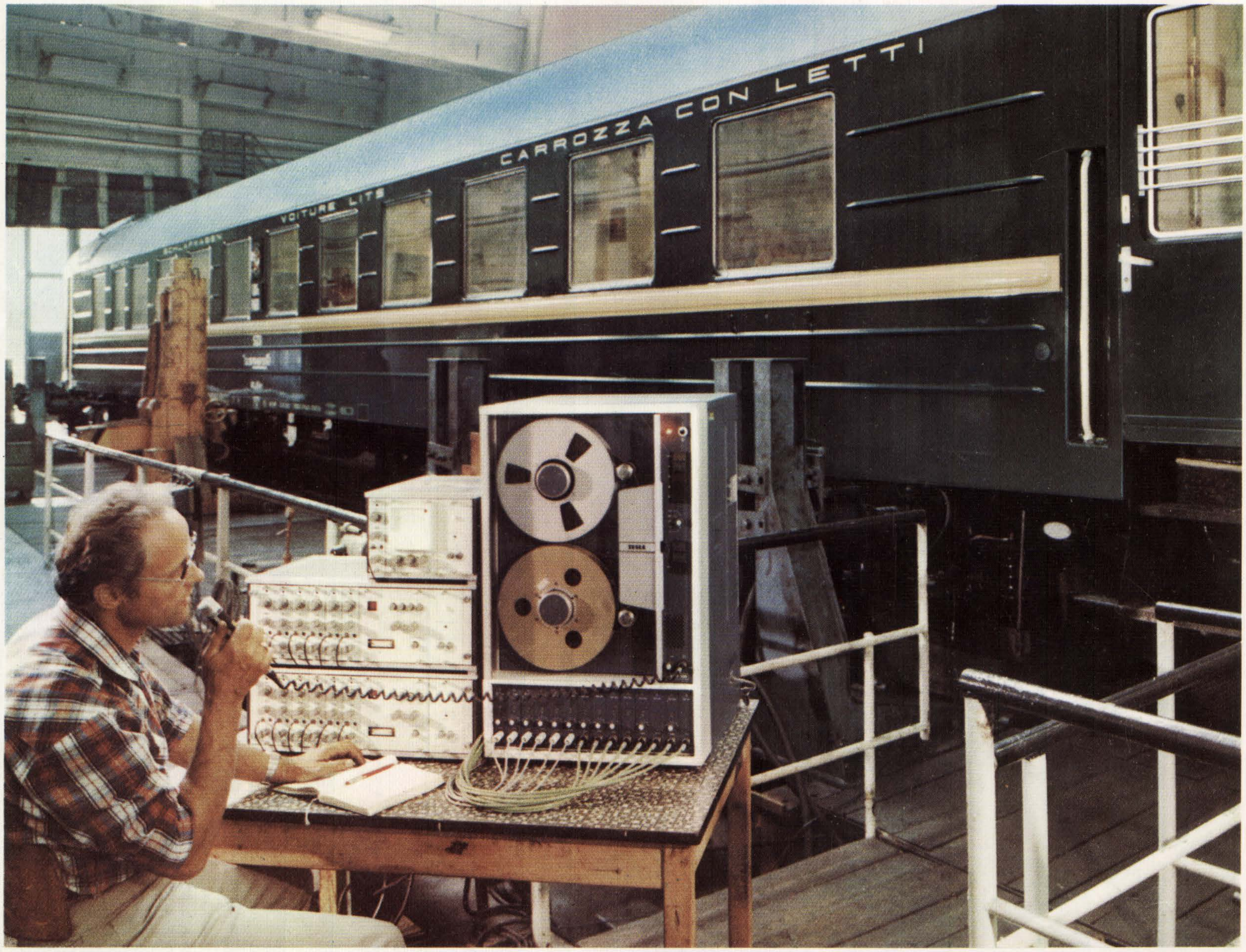
Summing up, it can be stated that Robotron offers a versatile range of typewriting systems affording proper solutions to any user's problems.



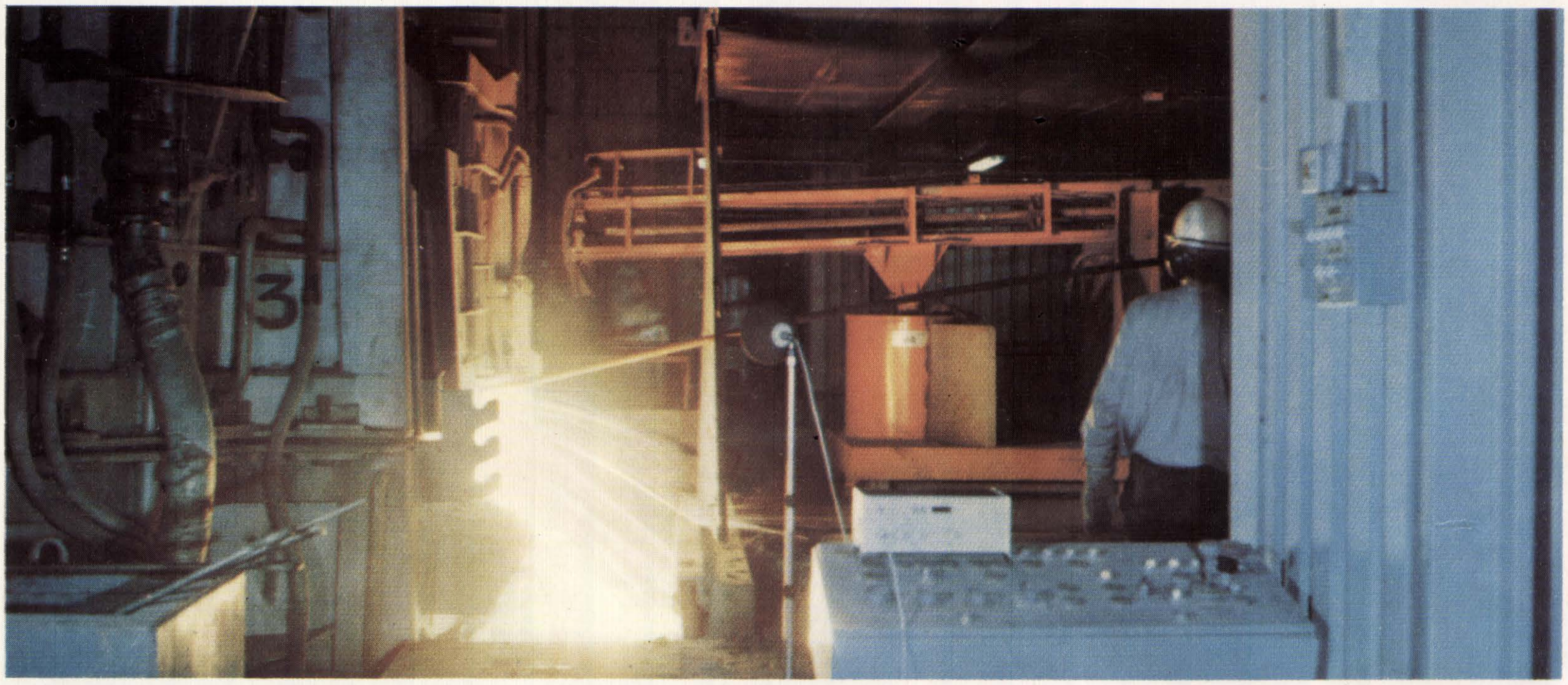
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Electronic Measuring Instruments Made in Dresden



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1 Vibration measurements carried out on a sleeping car

2 Noise measurement undertaken in a steel works using the 00 026 precision-type sound level meter

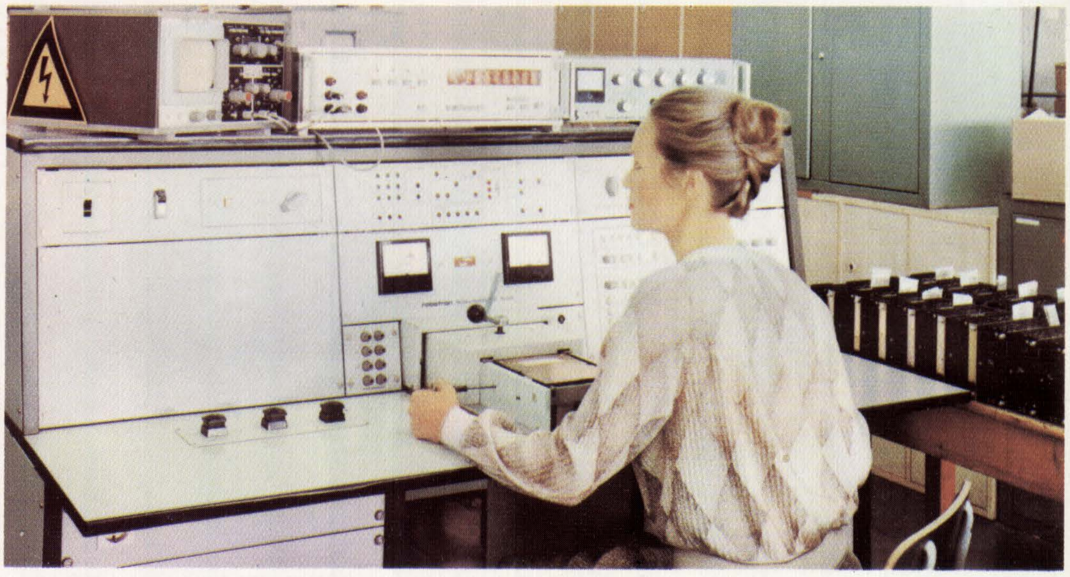
3 Type 30 020 automatic tester for use on power supply assemblies; semi-automatic test stand for checking switchable mains power packs

4 Cable testing van in service

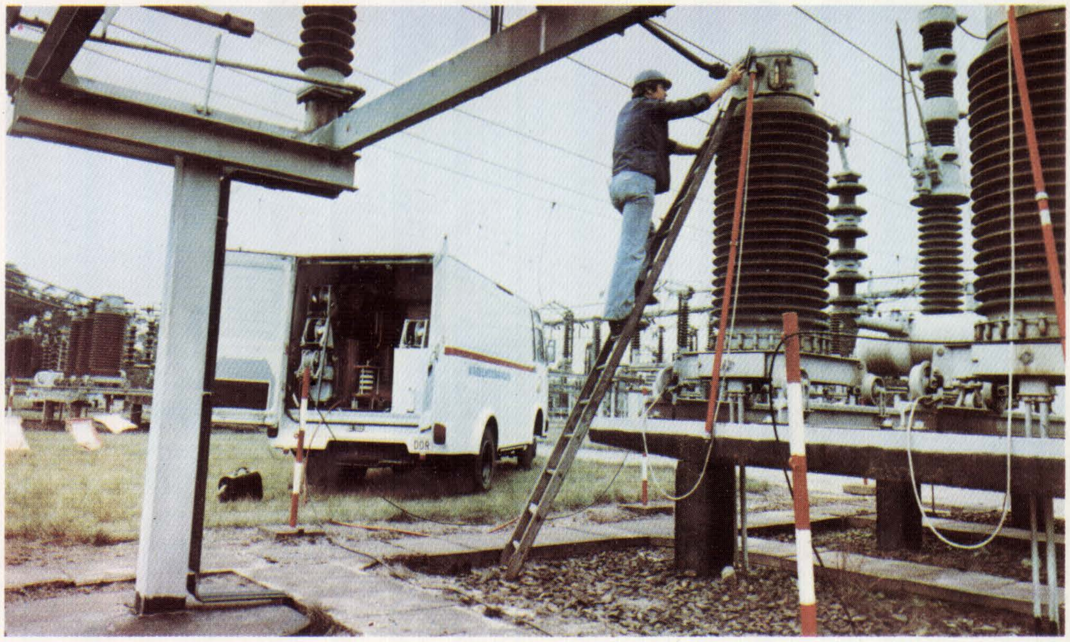
For more than 35 years, highly sophisticated electronic measuring instruments have been manufactured by VEB Robotron-Messelektronik "Otto Schön" in Dresden. The range of instruments available comprises those designed for sound level measurement, vibration measurement, radiation measurement, troubleshooting in cables and wirings, load moment limitation in mechanical lifting appliances and p.c.b. testing.

Customers from home and abroad are guaranteed a complete range of devices, a reliable service and adequate economic parameters.

The enterprise's direct affiliation to VEB Kombinat Robotron ensures the availability of complex data processing facilities along with the direct integration of microelectronics into the measuring instruments manufactured in Dresden. The microprocessor provides user guidance in connection with data input and prevents faulty operation. It controls the operational procedure during measurement, thus exemplifying applied microelectronics in the service of metrology. This will be elucidated by some examples:



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80 050 Troubleshooting Device

Being the basic device of the troubleshooting facilities on offer, the 80 050 unit is suitable for the fast and reliable location of any errors occurring in high- and low-voltage cables, telephone and telegraph lines over distances of from about 1 m up to 30 km. Fully equipped troubleshooting vehicles are available for mobile use. There are also ordinary vans fitted with this kind of equipment.

13 010 Load Moment Limiter

Constituting an electronic safety device for use with stationary as well as mobile lifting equipment, the 13 010 load factor limiter has been designed to ensure added safety along with higher efficiency. The crane as a technological aid used on all construction sites must not be overloaded or left running idle. The load moment limitation devices have been designed to protect the life and health of the operating staff. As early as 1969, cranes from the German Democratic Republic have been equipped with load moment limitation devices. It was thanks to these devices that the technical parameters of mobile lifting tackle could be employed to the full without impairing its stability. The type 13 010 limiter represents the integration of conventional force measurement equipment with up-to-date microelectronics. This equipment can conveniently be adapted to suit any type of crane. To put it in a nutshell–the 13 010 load moment limiter is a fully-electronic microprocessor-controlled safety device for use with mobile cranes and as such it is a token of reliability and efficiency.

M 3003 Circuit Board Tester

The M 3003 from VEB Messelektronik Dresden represents a genuine labour-saving device for application in the electronics industry. It permits to accomplish optimum productivity in testing fitted and soldered circuit boards for their being correctly fitted with component parts, the proper functioning and contacting of the latter, as well as in detecting short circuits. (The automatic tester is employed within the manufacturing process exactly at such a point where a more complex test is already possible and still economically feasible.) Each fault detected at a later stage in the technological chain can only be corrected with increased (by a factor of 10^3) effort. Using the M 3003 automatic tester, the error rate can be reduced to almost 10 per cent; on an average, costs are refunded after two years.

Thanks to the software available, programming times can be reduced to such a degree that the application of the circuit board tester also pays in the case of a large variety of circuit types manufactured in mean quantities.

robotron Information

At Fairs and Exhibitions

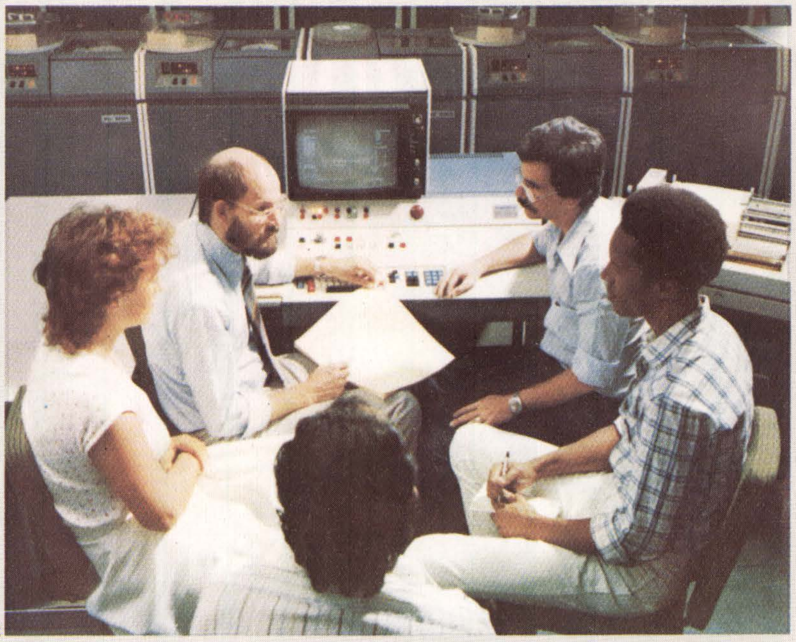
VEB Kombinat Robotron shows its products and user-oriented problem solutions at twenty to twenty-five international fairs and specialised exhibitions every year. At those events the combine is represented by the Robotron Export-Import foreign trade agency. At the fairs in Brno, Poznań, Budapest, and Hanover–to name but a few–Robotron has become just as regular an exhibitor as at the international specialised exhibitions in Moscow and Paris. The combine presents its complete export programme at the Leipzig Spring Fairs. At the autumn events, Robotron joins various trade-group displays in the individual fair buildings where it shows selected products and problem solutions geared to the specific line.

Among the more important international specialised exhibitions at which Robotron was showing was the 2nd International Exhibition of Production processing held in Moscow in 1983.

Highlights in the 1984 Robotron exhibition calendar were the specialised exhibitions in Ufa (USSR), Miskolc (Hungary) and Shanghai (People's Republic of China). At these events those interested had the opportunity to obtain thorough information on the many and varied applications of Robotron products.



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1 View of Havana

2 Training of foreign citizens in the Leipzig-based training centre

3 GDR exposition of Robotron products staged at the 2nd International Exhibition of Production Processing in Moscow

GDR Computer Equipment in Cuba

The successful co-operation between the GDR and Cuba in the field of computer equipment was highlighted by the handover of the first EC 1055 M edp installations to the Planning Commission and the Ministry of the Interior of Cuba in 1984.

The first large computer to be supplied by the GDR to Cuba was an EC 1040. It was installed in the Cuban Ministry of Foreign Trade in 1977. The computer's successful performance, which is underlined by its continuous operational availability of 95 %, was one of the reasons for such important institutions as the Cuban National Bank, the State Committee for Material and Technical Supplies and the State Committee for Statistics of Cuba to install computers of that type in the years that followed.

Besides edp installations, everywhere in the offices typewriters, calculating machines, automatic accounting and invoicing machines, also printers from VEB Kombinat Robotron are being used. The preparatory work for introducing the robotron A 5120 and A 5130 electronic office computers, as well as the robotron A 5220 data collection system has also been completed successfully. The equipment has been installed in important sectors of the national economy, e.g. in the sugar industry and in various material and technical supply sectors of the country.

25 Years Training Centre in Leipzig

The training and further qualification of computer personnel forms part of the Robotron customer service. The trainees are taught both the theory and the use of equipment and equipment systems. In the field of software the training programme includes courses for systems analysts, application programmers, software programmers, and operators. In the hardware sector equipment technicians and maintenance mechanics are trained. The courses are held in seven training establishments operated by the combine. The training centre based in Leipzig is the head institution.

Founded in September 1959, this institution is one of the major training establishments in Europe in the field of electronic data processing. Some 200 courses of differing nature, including courses for managerial staff, are provided by the training centre. More than 10,000 citizens from 18 countries receive training here every year. The teaching programme is based on a modular concept thus meeting the need for condensed teaching packages to ensure optimum training results within the specified training period.

Courses include lectures and seminars. Shop-floor training on modern equipment constitutes a considerable part of the teaching schedule. Constant exchange of experience with counterparts in the Soviet Union and in other CMEA countries serves the purpose of evaluating and utilising international experience in the further qualification of specialists.

VEB Kombinat Robotron as General Supplier

The efficiency of the producers of electronic data processing equipment, office machines and electronic measurement equipment is not only judged by the performance of the hardware they build, but in much the same way by the extent and the quality of the services they render to the users.

The range of products and services includes:

- Full-scale computer centres
- Technological facilities for producing computers and office machines plus ancillary equipment; electronic consumer durables
- Organisational solutions and data processing equipment for the health services
- Complete design, technologists' and project engineering offices (inclusive of drafting equipment, computing equipment, office machines, furniture and other interior outfit)
- Complete training centres and laboratories for college- and technical-school educated engineers, and for skilled workers in the fields of electrical engineering/electronics, electronic data processing, and information and organisational techniques, as well as for designers, project engineers, and draftsmen
- Measuring and training laboratories for electrical engineering; electronics; microelectronics; measurement electronics including sound and vibration measurements; nuclear radiation engineering; etc.
- Service stations for electronic measurement equipment, data processing equipment, and broadcasting and TV equipment
- Complete equipment for office organisation, typing pools, drafting and design offices.

The services we provide as general supplier include:

- Consultation, project management and manufacture
- Supply, installation and commissioning of the equipment
- Training and technical back-up service
- Sale of licences and technology transfer.

Speech Communication with Machines

The method of using speech as a direct form of input and output offers completely new possibilities of man-machine communication compared with the classical forms of data entry and output. Speech communication affords the following advantages:

- Spatial propagation of sound gives the user a high measure of mobility at the workplace
- The vividness of acoustic information catches more effectively the attention of the user
- Speech communication is ideal in applications where the user's hands and eyes are busy during a routine
- Existing communications facilities such as the public or in-house telephone service, can be employed for input and output
- Information can still be exchanged when lighting is poor and when ambient operating conditions do not allow satisfactory communication by other conventional techniques
- Its similarity with speech communication between persons permits unskilled personnel to be employed.

Speech communication facilities are an attractive proposition in the following application areas: graphics work stations; CAD systems; evaluation of radiograms and aerial pictures; microscopy work stations; quality inspection; sorting routines; flexible data capture in depots and trade; programming and control of NC machine tools and industrial robots; controlling and operator prompting functions in testfields and at control panels; workplaces for handicapped persons; communications engineering.

Speech Input and Output Hardware Offered by VEB Kombinat Robotron

ESE K 7821
Single pc motherboard speech recognition module as OEM unit based on the CPU U 880 (analogous to Z 80)

SEG K 7823
Table-top speech recognition unit based on the robotron K 1520 microcomputer

BAS K 7822.01
Operator, display and storage unit for the K 7821 and K 7823 speech recognition modules

KAM K 7801
Voice answer back module as a single pc motherboard synthesiser provided with storage for 4s of speech, a digital-analog converter, and power amplifier

KAG K 7802.01
Voice answer back module with external text addressing

KAG K 7802.02
Voice answer back module with internal addressing

UZG K 7802.03
Clock time announcer

KAG K 7803
Voice answer back module for a diversity of uses



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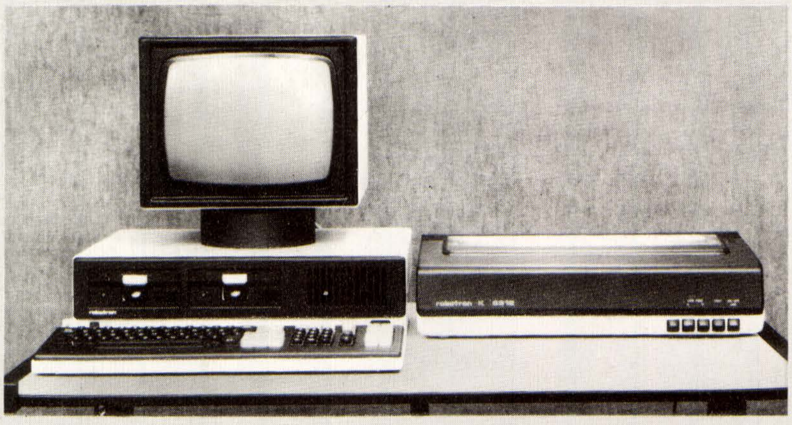
4 VEB Robotron-Elektronik Dresden – parent firm of VEB Kombinat Robotron – has its seat in the centre of Dresden

Robotron Products Earned Leipzig Fair Gold

Its pronounced international flavour and the high efficiency standard of the products on show were the outstanding features of the 1984 Leipzig Spring Fair in which 9,000 exhibitors participated. The high scientific-technical standard of the exhibits was also mirrored in the competition for the coveted gold medal which took place for the 43rd time. Gold medal awardees were, next to a great number of national and international exhibits, the robotron M 3003 printed circuit board tester and the robotron K 6312 hardcopy printer. More details on these items of equipment are given in the relevant articles of the current issue.



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5 The robotron M 3003 printed circuit board tester was awarded a gold medal at the 1984 Leipzig Spring Fair

6 robotron 1715 electronic invoicing-accounting machine with robotron K 6312 stylus printer

robotron 1715 Electronic Invoicing-accounting Machine

The robotron 1715 electronic invoicing-accounting machine made its first public appearance at the 1984 Leipzig Spring Fair where it attracted keen interest among home and foreign visitors. The hardware and software have been carefully matched to comply with the needs of day-to-day settlement of document-oriented invoicing and accounting routines in all areas of the economy. Flexible configurability, backed by software geared to specific applications, ensures that the robotron 1715 electronic invoicing-accounting machine can be tailored to individual needs.

Robotron Computer Handed Over to Polish Insurance Company

A robotron A 6402 commercial basic computer system was handed over to the Polish insurance company PZU in Warsaw towards the end of February 1984. To begin with, 16 robotron office computers have been connected to the system and their number is to be brought to 38 later on. In the next few years, all Województwo branches of the insurance company will be equipped with basic computer systems of that type. Later in 1984, such systems will be set up in Poznań, Wrocław and Katowice.

Further robotron A 6402 systems will be put to use in the "Friendship" cotton spinning mill in Zawiercie. The factory was also among the first users of the robotron A 5220 data collecting system.

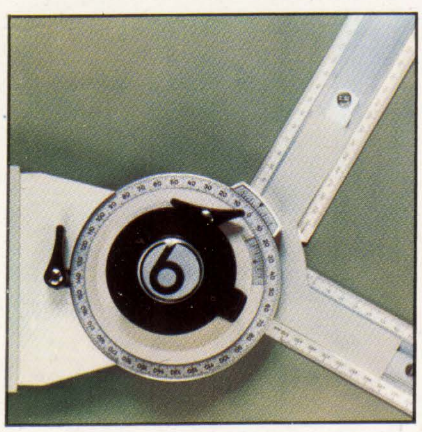
robotron– A Trade Mark Well-known in Czechoslovakia

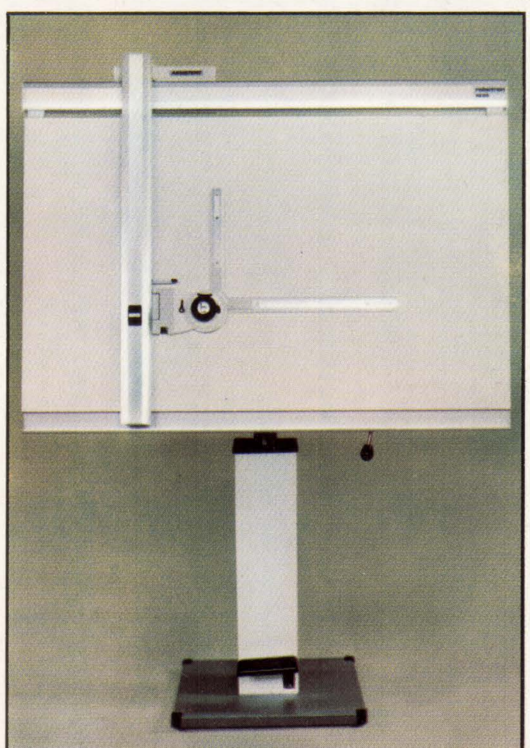
High-performance edp equipment and installations from VEB Kombinat Robotron, plus the relevant software–both system packages and application packages–, are used throughout Czechoslovakia's economy. A total of 65 type EC 1040/ EC 1055 and EC 1055 M edp installations are in operation in coal mines, in the electric power industry, in banks and insurance companies; some 6,000 robotron 1370 electronic data collection units give satisfactory service in farm enterprises, the electric power industry, in computer service centres, the transport sector, the food industry and elsewhere; around 3,000 small electronic accounting machines help to increase efficiency especially in banks and domestic trade. The sale to Czechoslovakia of 400 robotron A 5120/ A 5130 office computers, which operate to the full satisfaction of their users in many industries, is further proof of the high regard in which Robotron products are held in that country.

robotron

REISS Drafting Equipment







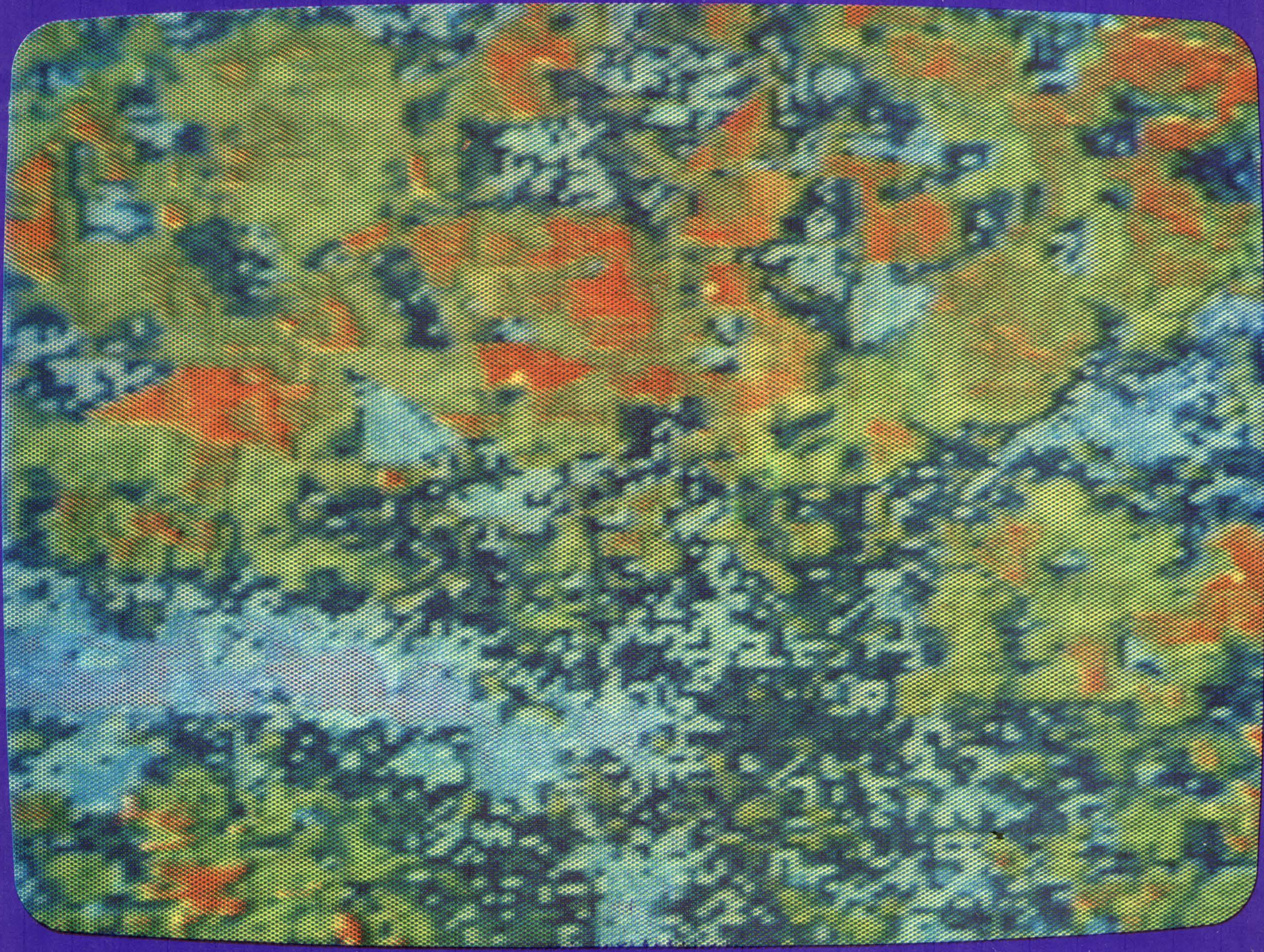
Any production process begins with a drawing, which is made in the design office. Already at this early stage, the degree of efficiency of the production process is determined.

robotron REISS drafting machines are precision devices embodying a hundred years of experience and solid skill. In developing such machines, the emphasis is on stability, reliability, drafting precision, convenient operation and, last but not least, modern design.

robotron

Production Programme

Electronic data processing installations
Basic computer systems
Office computers
Data collecting units and systems
Terminals and OEM products
Text systems
Typewriters
Drafting machines and organisation aids



Electronic measuring equipment
Microwave systems and instruction units
Audio and video electronics

We undertake:
Consultancy, training and customer service
Project management and elaboration of application packages
Sale of licences and technology transfer